

A TRANSACTION COST APPROACH TO VERTICAL INTEGRATION

THE CASE OF THE SWEDISH PULP
AND PAPER INDUSTRY

Per-Olof Bjuggren

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PER-OLOF BJUGGREN

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Abstract The aim of the study is to explain vertical integration in the Swedish pulp and paper industry by applying a transactional analysis. The study demonstrates that traditional theories of vertical integration can be regarded as special cases of a more general transactional approach that stresses small-numbers exchange and uncertainty in demand or supply as central factors in the choice between vertical integration and market contracts in both the short-term and the long-term. Small-numbers exchange implies the existence of an appropriable quasi-rent that mitigates against the use of short-term contracts relative to the alternatives, namely long-term contracts and vertical integration. When small-numbers exchange is paired with uncertainty both short-term and long-term contracts tend to be costly compared with vertical integration. In addition, similar know-how requirements between adjacent stages favour the choice of vertical integration as the transaction mode. In the Swedish pulp and paper industry vertical integration is common between forestry and pulp production and between pulp and paper production. Furthermore, vertical integration is also common between paper production and paper conversion for the paper grades liner, fluting, sackcraft and tissue. Market transactions are in all these cases characterized by small-numbers exchange and uncertainty. The greatest degree of vertical integration is found between pulp and paper and between tissue and tissue conversion, where in each case the scope for bargaining due to the advantages of technical integration is especially large. The integration between forestry and pulp production has also been influenced since the turn of the century by legal restrictions in the transferability of ownership rights to woodland.			
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THE CASE OF THE SWEDISH
AND FINNISH PAPER INDUSTRY

Per-Olof Bjuggren

ERRATA

- p. 79 Instead of "Private woodlot owners without membership in a f.o.a." in Table 5.6 read "Private woodlot owners".
- p. 82 Instead of "(see the periods 1974-75, 1979-80 and 1983 in Table 5.1 at the top of the page read "(see the periods 1974-75 and 1979-80 in Table 5.5)".
- p. 117 Instead of "loe/ton" in Table 6.5 read "loe/tonne".
- p. 124 Instead of "Papetrie de Ponte Sainte Maxence SA" in Table 6.1 read "Papeterie de Pont Sainte Maxence SA".
- pp. 160-161 Instead of "Papiersackfabrik Junemann GmbH", "Walter Durbeck Papiersackfabriken" and "Polysackfabriken Walter Durbeck" in Table 7.5 read "Papiersackfabrik Jünemann GmbH", "Walter Dürbeck Papiersackfabriken" and "Polysackfabriken Walter Dürbeck".
- pp. 216-217 Hägg, I. and J. Johansson, 1982, . . . on p. 217 is to be replaced by Hägg, I. and J. Johansson, (eds.), 1982, . . ., which has misstakenly been placed at the bottom on p. 216.
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1 INTRODUCTION

1.1 Aim and Plan of the Study

The aim of this study is to explain the development of vertical integration within the Swedish pulp and paper industry by applying recently developed theories of transaction costs and economic institutions. The study also intends to make a contribution to the theory of vertical integration.

Pulp and paper form two intermediate stages in a production chain that starts with wood fibre and ends with paper products such as newspaper, paper sacks, tissue papers, drawing blocks etc. The activities of the successive stages can be coordinated by two alternative transactional arrangements or institutional modes: vertical integration (intrafirm transactions) and trade between independent firms on a market (interfirm transactions). This study claims that transaction costs determine the costs and benefits in the choice between these two alternative modes. Vertical integration is considered the most efficient way to coordinate activities if it entails the lowest transaction costs.

The concept vertical integration describes the extent to which different stages in a chain are under the ownership, management, and control of a single firm. A company producing pulp may integrate backwards by buying forest land or integrate forwards by processing pulp into paper in its own paper mills. A paper company may integrate forwards by processing the paper in its own converting plants or backwards by acquiring pulp mills.

Since the 1950s, several Swedish forest companies have increased their degree of vertical integration, especially the degree of forward integration. The share of Swedish pulp production that is exported and sold on the domestic market has been reduced from 69 per cent in 1950 to 38 per cent in 1982. The degree of self-sufficiency of wood fibre (backwards integration) has in some companies been increased by closing down pulp mills, acquiring forest land from other companies and/or companies with large forest areas. The possibility of the

Swedish pulp and paper industry increasing the degree of backward integration by purchase of land from private woodland owners has, however, been severely circumscribed since 1906 by the Land Acquisitions Act.

Pulp products have successively become more and more integrated with paper production. There has also been a drive towards forward integration from the paper stage. All major producers of liner/fluting are forward integrated with box plants. Producers of sackcraft also have paper sacks in their production programme. Soft tissue production is usually integrated with tissue conversion. Fine paper is sold on the Swedish market through paper merchants owned by the producers. Thus, vertical integration is a strategy adopted by many Swedish pulp and paper companies.

The central question to be answered in this study is: why is vertical integration (intrafirm transactions) chosen to such a large extent for the coordination of activities in adjacent stages instead of contractual alternatives based on interfirm exchanges?

This thesis argues that a transactional view provides a deeper and more general insight into vertical integration than earlier theories that only aim at showing the possibility of a joint profit maximum through the unified ownership of successive stages without considering either transaction costs or alternative contractual solutions.

The study is organized in two parts: one theoretical and one empirical. The theoretical framework is provided in Chapters 2 and 3. The application of the theory to the Swedish pulp and paper industry is made in Chapters 4 to 8. Chapter 4 describes how the theory is to be applied in the empirical study and summarizes the findings in two tables (Tables 4.1 and 4.2). The transactional arrangements under which the raw material, i.e. wood fibre, is supplied to the pulp industry are discussed in Chapter 5. In Chapter 6 integration between pulp and paper production is studied. Forward integration from the paper stage is analyzed in Chapters 7 and 8. Chapter 9 summarizes the study and offers concluding remarks.

1.2 Methodology

This thesis studies the organization of economic activity in a production chain. Instead of the traditional microeconomic concept of the firm as a production unit that transforms inputs into outputs under constant, increasing or decreasing rates of return, the firm is viewed as a nexus of contracts in different product, financial and factor markets. The transaction costs associated with different types of contracts determine the set of contracts chosen. Assuming profit maximization, the set of contracts that minimizes total transaction costs is chosen.

The study draws upon the rapidly emerging literature on property rights, transaction costs and contracts. The way different property rights in an economy are specified by law and tradition is thus central to the analysis.

Data for the empirical study has been collected from primary as well as secondary sources. A large number of company officials and other persons related to the Swedish pulp and paper industry have been interviewed and several plants have been visited (see Appendix). These interviews and visits by the author have provided data as well as suggested hypotheses to be examined.

This study is unique in a Swedish and international context in its choice of theoretical approach and empirical application. Among earlier American and British studies of vertical integration in specific industries, there is, as far as the author has found, none which analyzes vertical integration in the pulp and paper industry using a transactional approach.

There have been a host of studies of vertical integration in various industries, e.g., in the iron and steel industry (see, e.g., Dennison, 1939 and Mancke, 1972); in the oil industry (see, e.g., McLean and Haigh, 1954; Cazeau and Kahn, 1958 and Mitchell (ed.), 1976); in the automobile industry (Crandall, 1968); in the cement industry (Peck and McGowan, 1967 and Allen, 1971); in the aluminium industry (see, e.g., Clarke, 1974 and Stuckey, 1983); in the television broadcasting industry (see, e.g., Russel-Litman, 1979); and in the diesel-electric

locomotive building industry (Marx, 1976). Only one article on the locomotive industry (Marx, 1976), a study of vertical integration and joint ventures in the aluminium industry (Stuckey, 1983) and a few studies of vertical integration in the oil industry (Mitchell (ed.), 1976) apply a transactional approach to vertical integration.

One study exclusively devoted to vertical integration in the pulp and paper industry was presented by OECD (1982). Its primary aim was to examine the tendencies towards integration in the OECD-countries. Besides the choice of geographical area, the report differs from the present one in being more descriptive, with no references to economic theory. Another study of the pulp and paper industry by Berard (1977) describes in one chapter the cost savings through technical integration between pulp and paper but no explanation is provided as to why these cost savings imply choice of vertical integration as a transaction mode.

1.2.1 Earlier Swedish Empirical Studies

There are a few empirical studies of vertical integration within the Swedish economy. Bengt Högberg's (1977) dissertation in business administration studies vertical as well as horizontal and lateral cooperation. Högberg's thesis differs from the present one by being primarily interested in cooperation between firms in the form of joint ventures, joint programmes and long-term contracts, and not in vertical integration as such. Furthermore, short-term contracts are not considered. Högberg's dissertation does not use the property rights, contracts, and transaction costs paradigm as is done here.

Another dissertation in business administration by Lars-Eric Gadde (1978) examines demand variations in "vertical marketing" systems within the Swedish steel industry, i.e. how demand variations are transmitted through the different stages in the production chain for steel. Gadde's study is also not of a transactional character. There is no analysis of how variations in demand for a good in a vertical marketing system are influenced by choice of transactional mode.

Variations in a "vertical marketing" system are also the subject of a dissertation by Steffan Brege (1979). Brege's study is akin to the present study in the choice of empirical field and in the explicit recognition of vertical integration as one of many different strategies to choose between in a vertical marketing system. Instead of considering the whole pulp and paper industry in Sweden, Brege performs his empirical analysis as a case-study of a single forest company.

Different types of contracts used in the pulp and paper markets where Swedish companies operate are described by Kinch (1974). Kinch uses a system-theoretical approach according to which the choice of contract is considered as a response to an uncertain environment of the firm. Another empirical study in which different contractual alternatives in paper transactions are discussed has been performed by Forsgren and Wictorin (SOU 1981:43). This study is also a case-study of a Swedish forest company. Its aim is to explain the integration forwards with foreign paper conversion plants.

Integration considerations are also taken up by Wohlin (1970) in a dissertation in economics. Wohlin analyzes the Swedish round-wood market according to a bilateral monopoly model. A similar analytical approach, but with a richer institutional description of the wood market, is provided by Lönnstedt (1977). Furthermore, integration aspects can be found in studies by the Department of the Industry (Ds I 1979:5) and SCPF (Svensk skogsindustri i omvandling) (1970), Forsgren and Kinch (1970), Klint (1979), Ahgren (1982) and Nyström and Ahgren (1983). The studies by Ahgren and Nyström and Ahgren contain an investigation of different contracts used on the kraftliner and newsprint markets.

Although all the authors referred to above discuss vertical integration and contracts, their studies differ from the present one by not using a transactional approach, where the choice between vertical integration and contractual exchange between independent firms is analyzed in terms of transaction costs and property rights. Thus, it is safe to conclude that the present study is unique in its stress on transaction costs in explaining vertical integration.

PART I. THE THEORETICAL FRAMEWORK

2 THE FIRM VERSUS THE MARKET

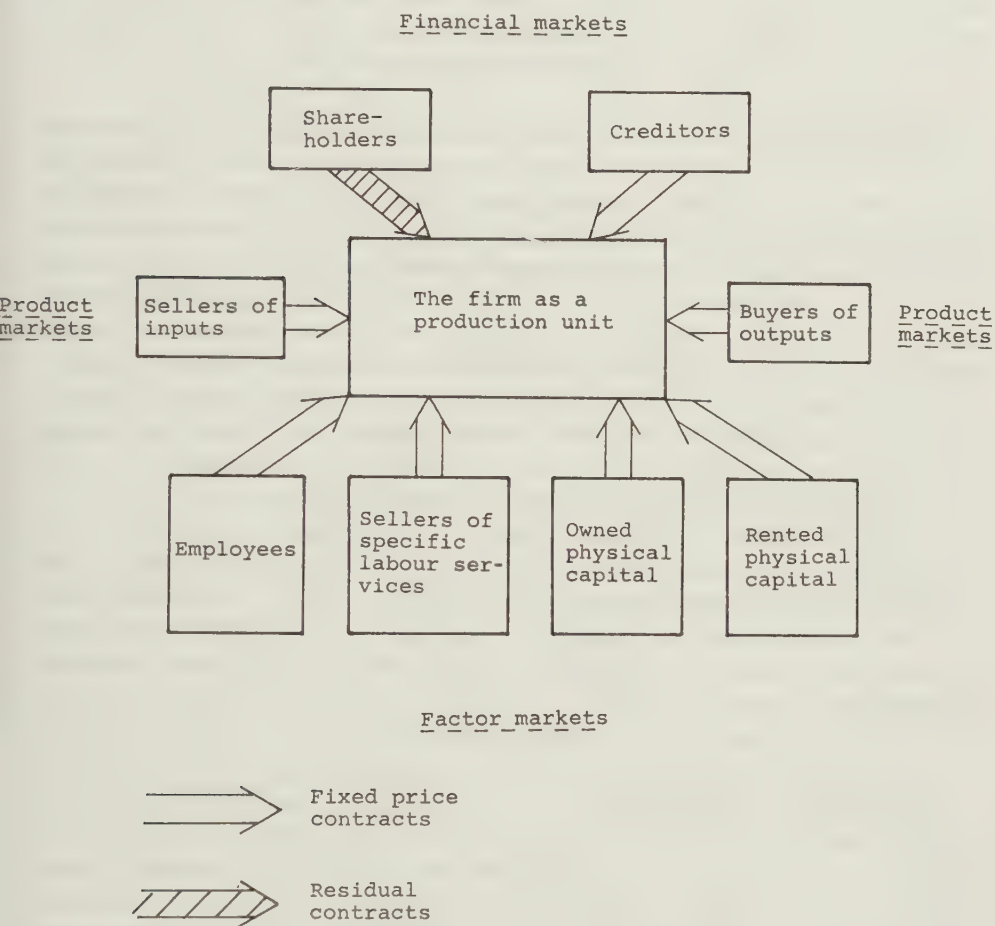
2.1 The Firm as a Nexus of Contracts

A firm is viewed here as composed of a number of contracts.<1> This view is consistent with the ideas developed by Coase (1937), Alchian and Demsetz (1972) and Williamson (1975), whose analyses centre around the transactional implications of different institutional arrangements. Contracts are concluded on product, factor and financial markets (see Figure 2.1). Contracts in these markets differ in character. The structure of the firm (i.e. if it is vertically, horizontally or laterally integrated) and the type of firm (if it is a corporation, a cooperative, a partnership etc) is determined by the contracts chosen.<2>

The firm as a production unit is surrounded by product markets for the sale of outputs and purchase of raw materials, by factor markets for the purchase/hire of capital and labour and by financial markets for the provision of financial capital. The strategic decisions of a firm to make instead of buying or to process instead of selling (i.e. to vertically integrate backwards or forwards), involve a substitution of contracts on factor markets for contracts on product markets.<3> Contracts for purchase of raw materials or contracts for sale of outputs will be replaced by hire and ownership of capital and hire of labour in earlier or later stages, when a firm vertically integrates.

Capital Markets. In markets for capital goods and natural resources a choice exists between ownership and different rental arrangements. Ownership of a physical asset implies that the owner has an exclusive right to decide how to use the asset within certain limits defined by the law.<4> It also implies the right to change the form and substance of an asset as well as the right to sell a physical asset on whatever terms the seller and the buyer find agreeable.<5> Other contracts, like renting and leasing, do not give these rights.

Figure 2.1 The Contractual Structure of the Firm.



Source: Ståhl (1976)

Labour Markets. The other production factor, labour, cannot be owned as slavery is illegal. The contract that comes closest to ownership in respect of the possibility of deciding on the use of labour is the employment contract. The alternative to an employment contract is to hire labour to perform a specific labour service.<6>

Financial Markets. External funds for acquiring assets are raised on financial markets. If the firm considered is a corporation, there are two types of contracts to distinguish between: (a) contracts with a fixed interest rate such as bonds and loans, and (b) contracts with residual claims on the revenue stream of the firm such as common stocks. In a corporation the shareholders undertake the entrepreneur's role (in Knight's sense) of guaranteeing the payment of all other contracts by being residual claimants, and by putting up equity investment as an ultimate guarantee for payment.<7> The ultimate authority to review the contracts of the factors of production rests with the residual claimants because nobody would risk his or her wealth without the possibility of influencing its use.

The identity of the residual claimant and the character of the residual contract determine the type of firm. In a cooperative the residual claimant can be found among the suppliers or customers, while the supplier of risk capital, i.e. the shareholder, is the residual claimant in a corporation.

2.2 Definitions and Concepts

A production chain describes the transformation of a raw material into a final output. Certain sets of activities, e.g. pulp and paper making, are easily separable into stages.<8> The inter-stage transactions can take place either (a) between independent firms or (b) within firms. The concept "vertical integration" refers to the latter case of internalization of transactions.

One characteristic of vertical integration is common ownership of assets in adjacent stages. This definition is accepted by most writers.<9> Several writers also stress the employment contract as another inherent characteristic of vertical integration.<10> They argue that without an open-ended contract such as the employment

contract for the factor labour it is not possible for a firm to control the use of its resources through central administrative decisions.<11> The notion that the employment contract is also a characteristic of the firm will be adopted in this thesis.

A change of vertical integration can be either backwards (upstream) by producing an input formerly bought from independent firms or forwards (downstream) by further processing an output that used to be sold to independent firms. Different ways to accomplish these changes of industrial organization are (1) merger with supplier/customer, (2) acquisition of existing facilities or (3) building of new facilities in adjacent stages.

Vertical integration by merger or internal growth will be resented by the incumbent shareholders unless the total income to be shared is increased. This condition will be met if the discounted profit of an integrated firm is larger than the combined discounted profit of independent firms operating in adjacent stages. Vertical integration is a more efficient way of organizing industrial operations in this sense if it represents savings relative to alternative contractual arrangements.

Complete integration refers to the case where there is an equality between internal supply and demand of a good. Partial integration means that a firm has to satisfy part of its total demand for an input by purchase from other firms, or it can only use a part of the production of a good internally. An integrated forest company may e.g. have to buy part of its total demand for wood from independent forest owners and/or sell part of the pulp production to other paper companies.

Vertical integration and purchases/sales on markets are two alternative ways of organizing transactions. The dichotomy between vertical integration and the market is of central importance in the works of Coase (1937 and 1972), Malmgren (1960), Richardson (1972), Blois (1972), Williamson (1971 and 1975), Levy (1981) and Cheung (1983) and others. The firm, or vertical integration, represent institutional arrangements where coordination of activities can be achieved through central administrative decisions. In the market the coordination of economic activity takes place instead among

independent decision-making units (firms) through the use of the price mechanism.

In addition to use of the price mechanism and separate ownership, some writers such as Malmgren (1960, pp. 400-403) and Richardson (1972, pp. 883-884), stress spontaneous coordination without any long-term relational commitment as a distinguishing feature of a "market". A long-term contract is in this sense not to be considered as a pure market contract but rather as a cooperative arrangement where transactions are planned for a certain time period and are thus not spontaneous. Inter-firm cooperation does not have to be formal in terms of written long-term contracts. The goodwill of a firm in honouring implicit agreements can suffice as a guarantee for a long-term relationship. The term "market" is confined instead to short-term contracts like spot-market contracts. This is the type of contract in which the buyer and the seller does not accept any "obligation with respect to future conduct".<12>

A number of other transactional arrangements that lie somewhere between the concepts of "market" and "vertical integration" what regards to the ability to supersede the price mechanism and continuity in interfirm relations can also be discerned. Suppliers and customers sometimes own shares in each others' firms. If the shares amount to less than fifty per cent of the total votes it is not appropriate to talk about common ownership. An ownership share must not, however, exceed fifty per cent in allowing influence on the decision-making of another firm. Besides minority ownership of different degrees, joint ventures belong to this category of ownership relations close to vertical integration. An example of the type of joint ventures referred to is a paper mill owned jointly by a pulp producer and a paper converter. Another example of a contract close to integration by ownership is the stumpage sales contract on the wood market (see Section 5.3.2).

Activities such as research and development and marketing are often decided upon according to cooperative agreements between the supplier and the customer.<13> Under this type of contractual arrangement the parties coordinate their plans of the future.

In this thesis, majority ownership of assets in successive stages (more than 50 per cent of the voting stock) is used as a definition of vertical integration.<14> It is also recognized that there are other transactional arrangements close to vertical integration with respect to the ability to influence resource allocation through central administrative decisions and continuity in relations. Arrangements such as minority ownership, joint ventures, stumpage sales and cooperative agreements such as joint programmes are more or less related to vertical integration in terms of continuity in relations and the possibility of supersession of the price-mechanism.

2.3 Transaction Costs and Contracts

2.3.1 The Concept of Transaction Costs

The transaction costs associated with different contractual arrangements determine the choice of transactional mode in a production chain and thereby the degree of vertical integration. Resources must be spent in order to make trade possible. Three different categories of transaction costs with contractual implications have been distinguished.<15>

The first category, search or contact costs, refers to the costs of acquiring information about circumstances pertinent to the decision concerning whether or not to enter into exchange negotiations. These are costs of making contact, selecting information on prospective buyers/sellers, quality etc. By creation of market-places, introduction of middlemen, advertisement and holding of inventory the search costs can be lowered.

The next category of costs incurred are negotiation or contract costs. By negotiation costs are meant the costs of concluding a contract. Contract terms such as price, payment, quality, quantity, delivery terms etc have to be specified and negotiated and perhaps also stated explicitly in written form.

The fact that contract terms have been negotiated and agreed upon does not necessarily bring an end to all problems associated with an exchange of property rights. The fulfillment of the contract terms has to be monitored and enforced. The costs of monitoring and enforcing an agreement (i.e. control costs) constitute a third category of transaction costs. These are the costs of screening quality, metering quantity, observation of contingent events and of making sure that restitution is being made for default.<16> While the costs of contacting and negotiating contract terms are of a pre-contractual character, this third category considers post-contractual transaction costs.

Pre- and post-contractual problems can be analyzed by a prisoners' dilemma type model. We will here, by way of elucidation, first consider how the rise of enforcement costs can be explained (for use of a prisoners' dilemma model in the analysis of pre-contractual costs see Section 3.2.2).

When an exchange agreement has been concluded between two parties, difficulties may arise "because in the absence of legal or moral sanctions one party will frequently find advantage in breach of an agreement honoured by the other".<17> The breach can consist of delivering an inferior product, not delivering in time, or withholding payment for delivered goods.

The prisoners' dilemma problem in this context is illustrated by the payoff values in the matrix in Figure 2.2. Each party has in the matrix two strategies to choose between, to honour or to breach an agreement. Joint profits are maximized if both parties honour the agreement. It is however to the advantage of one party to breach an agreement honoured by the other. The individual profit of the breaching party can thereby be increased to a maximum value of 4, while the honouring party only receives the minimum payoff of 1. To breach will therefore dominate as a strategy independent of the choice of the other contract party.

Figure 2.2 A Prisoners' Dilemma Game

	Honouring agreement	Breach of agreement
Honouring agreement	3,3	1,4
Breach of agreement	4,1	2,2

One way to make breaches less profitable is to enter into legally binding agreements.^{<18>} By legally binding agreements the payoff values can be changed, e.g. with fines, to give lower values in the case of breach of contract (see Figure 2.3).

Figure 2.3 Change of Payoff Values through Binding Contracts

	Honouring agreement	Breach of agreement
Honouring agreement	3,3	1+3, 4-3
Breach of agreement	4-3, 1+3	2,2

Note: The payoff matrix of Figure 2.2 has been changed by the introduction of a fine of 3 from the breaching party to the honouring party.

One way to make breaches unprofitable is to engage in recurrent trade.^{<19>} In recurrent trade a breach of an exchange contract will generate a one-time gain that is to be compared to the future profits from repeated trade that will be foregone because of this behaviour or strategy.^{<20>} In this case it may not be necessary to use legal steps to enforce agreements. The knowledge that the conditions of future trade will be affected in a negative way is a reason not to breach

agreements.<21> The contracts in the pulp trade can serve here as an example (see Section 6.4 in Chapter 6). A buyer who is not honouring a contract during a recession runs the risk of being "punished" during a boom (sellers' market) by receiving less favourable conditions. Similar a seller not honouring a contract during a boom can be "punished" during a recession '(buyers' market).

If the enforcement problem is large (and appeal to a court or an arbitrator is considered too costly) the advantages of a long-term binding arrangement between parties, may be assured through vertical integration. With common ownership, the terms of delivery of a raw material or semi-finished good can be enforced internally by fiat.

2.3.2 The Approach by Williamson

Williamson (1975) lists different human and environmental factors that make contractual exchanges (interfirm transactions) costly relative to vertical integration (intrafirm transactions).<22> The bounded rationality of the human being and the complexity/uncertainty of the environment are two primary sources of transactional problems in contractual relations. Bounded rationality refers to the limited capacity of the human mind to conceive and evaluate all alternatives pertinent to a decision. Because of bounded rationality complexity/uncertainty is important in an analysis of transaction costs. If the number of events, deterministic or contingent, to consider in a transactional decision is large, bounded rationality will make it costly to draw a decision tree describing all alternatives.<23> A complete once-for-all contract covering all possible outcomes is prohibitively costly to design.

Williamson pays special attention to the case where bounded rationality and uncertainty are paired with small-numbers exchange (lack of competition). Uncertainty and bounded rationality give rise to situations with asymmetrical distribution of information about exchange conditions between traders. In case of small-numbers exchange this asymmetry in information invites to opportunistic behaviour whereby the costs of transacting are increased.<24> By opportunism is meant the use of strategems to promote self interest at the expense of others (see the prisoners' dilemma above). Personal advantages are

achieved inter alia by disclosing information in a selective or distorted way or making false promises regarding future conduct. The aim is to take "advantage of unspecified or unenforceable elements of a contractual relationship".<25> Under a competitive regime (large-numbers exchange in Williamson's terminology) this is not a viable strategy as an opportunistic trader will not get a renewed contract on the same terms as at the outset.

2.3.3 Short-Term Contracts

The contracts most in accordance with the economist's traditional view of the market are short-term contracts. Such contracts are most likely to be used in transactions characterized by:<26>

- standardized commodities
- homogeneous transactions in the respect that the identity of the trading partner is irrelevant
- many sellers and buyers and rivalry (competitive) behaviour on both sides of the market

In such a trading situation information costs, negotiation costs, and enforcement costs can be kept at a minimum. Contact-making is made easy and prior inspection is not as necessary as for heterogeneous goods. Small-numbers exchange situations do not arise in markets characterized by standardized commodities, homogeneous transactions, many sellers and buyers and rivalry. Costly haggling will not occur; thereby negotiation costs are lowered. As the transactions are short-term there is no need to make exhaustive stipulations for future events affecting these transactions. Enforcement costs can be kept low, as opportunism will result in loss of future business. Even if the transactions are taking place only occasionally, opportunism can be circumscribed by consulting rating services or the experience of other buyers.<27>

When the conditions above are not fulfilled, long-term contracts, different cooperative arrangements, minority ownership or vertical integration will be more advantageous than short-term contracts.

2.3.4 Long-Term Contracts

The long-term contract is likely to be the preferred transaction mode if there are small-numbers exchange and a low degree of uncertainty about exchange conditions.<28>

In small-numbers exchange situations there is mostly transaction-specific capital involved. What is referred to are assets, physical or human, that are specialized to a particular transaction partner. Williamson (1979 and 1981) distinguishes between three different kinds of asset specificity: (1) site specificity, (2) physical asset specificity and (3) human asset specificity.<29>

Site specificity arises because, e.g., the production stages are located in close proximity to each other. The second category, physical asset specificity, refers to situations where a product tailored to the needs of one particular user is produced by means of special-purpose equipment. Finally, human asset specificity arises in a learning-by-doing fashion.

A peculiarity of transaction-specific capital is the existence of appropriable quasi-rents that might induce opportunistic behaviour. The quasi-rent of an asset is the difference between the value in its first best use and the value in its next best use, where the value in its next best use can be equal to the salvage value. The appropriable part of this quasi-rent is the portion in excess of the value of the asset to the next highest valuing user. The reason why there exists an appropriable quasi-rent is that "once installed an asset may be so expensive to remove or so specialized to a particular user that, were the price paid to owner somehow reduced, the asset's services would still be available to that user but on more favourable terms".<30>

For a price region corresponding to the appropriable quasi-rent, there will be a bilateral trading relation with only one buyer and one seller. Both the user and the supplier are locked into the transaction, as the supplier will continue to supply as long as the price is in excess of what can be offered by an alternative customer and the buyer will purchase as long as the price is less than the average value of the input in his production. Both the supplier and

the user have incentives to appropriate as large a portion of the joint quasi-rent as possible through opportunistic behaviour, i.e. try to take advantage of unspecified or unenforceable elements of the contractual relation. The larger the size of the appropriable quasi-rent, the stronger these incentives will be.

The costs of using short-term contracts in transactions, where transaction-specific capital is involved, are high. Each contract party has at the time of contract renewal an incentive to try to capture an additional part of the joint quasi-rent. The result is that the negotiation costs will be higher, the more frequently new contracts have to be concluded. Furthermore, investments in transaction-specific assets are likely to be shunned as there is no guarantee that a competitive return can be earned.⁽³¹⁾ By a long-term contract, that specifies each party's behaviour over an extended period of time, revenues and costs can be made more amenable to planning and negotiation costs can be lowered as a series of short-term contracts is replaced by one contract.

The efficiency of a long-term contract compared to vertical integration in a small-numbers exchange situation is dependent on both the degree of uncertainty about exchange conditions and the size of the appropriable quasi-rent. The lower the degree of uncertainty, the lower the costs will be for specifying and negotiating a long-term contract that leaves little scope for opportunistic and strategic behaviour. *Ceteris paribus*, the larger the appropriable quasi-rent, the stronger are the incentives of independent suppliers and customers to behave opportunistically.

The influence of uncertainty on transaction costs can be illustrated as follows. Assume that a long-term contract of a duration period equal to the depreciable life of a transaction-specific asset is considered. The long-term contract can be of a complete or incomplete character. A complete contingent claims contract would, if the degree of uncertainty is high, be prohibitively costly to conclude because of bounded rationality. The problems of anticipating all contingencies and specifying efficient adaptations to these contingencies make such a contract unrealistic, i.e. too expensive.

An incomplete contract offers a possibility here to reduce these pre-contractual costs. Instead costs will arise in connection with sequential adaptive decisions in the face of events that were unforeseen when the exchange contract was concluded. Where such an adaptive decision has consequences for the division of the appropriable quasi-rent, costly haggling over the division can result. A constraint to opportunistic behaviour and costly haggling can be that the parties want to safeguard their business reputations as suppliers or customers.<32> The problem with the use of an incomplete long-term contract in transactions marked by uncertainty about future exchange conditions is thus the post-contractual costs that can arise.

2.4 Transactional Advantages of Vertical Integration

What are the properties that make vertical integration (internal organization) an institutional mode suitable for organizing transactions characterized by small-numbers exchange and uncertainty? As pointed out in Section 2.2, the distinguishing mark of vertical integration (the firm) in a transactional sense is the ability to influence the use of resources at different stages through central administrative decisions. Centralized decision-making is made possible by the open-ended character of the employment contract and the ownership of assets.

A market, on the other hand, is characterized by the decentralized decision-making of independent suppliers and customers whose activities are coordinated through the price mechanism. Thus, the transactional advantages of vertical integration originate from the advantages of having employed personnel and of owning assets in adjacent stages, compared to transacting by contracts with independent suppliers/customers.

Firstly, vertical integration by merger or by internal expansion implies increased control and planning capabilities by choice of contracts that are of a more long-term character, less specified and more easily enforceable.<33> Instead of recurrent contracting with buyers/sellers in adjacent stages, long-term employment contracts and contracts for the purchase of durable physical assets are concluded. From the ownership of assets follows a freedom to determine the use.

The employment contract contains an area within which the employer is free to use the human capital of the employee. An employee in an adjacent stage can simply be ordered to deliver or receive a good according to certain terms. A refusal to supply or to receive goods can be enforced by an ultimate threat that the employee will be replaced in his/her present position or not promoted to a higher hierarchical level. In this respect vertical integration means that a strong enforcement mechanism is available.

The enforcement instruments in the form of a promotion ladder and the threat of being replaced are complemented by the auditing advantages of the firm. The audit of performance in integrated stages can be carried out on a long-term basis by specialists with an inside position.<34> The inside position means better access to internal material and also means that the auditing activities will be less resented, as the benefits of these activities are shared by employer and employees in the form of higher profits and higher wages/salaries and more secure employment.

A second major advantage of vertical integration is that the incentives of a downstream stage to increase its profits at the expense of an upstream stage and vice versa can be alleviated. There are no pre-emptive claims on the profit-stream.<35> The owners of an integrated firm (defined as the receiver of the residual income) will be interested in the joint profit of the integrated stages. Managing directors of integrated firms tend to be employed according to their ability to coordinate the activities in different stages in a joint-profit maximizing way. A manager that increases the profits in "his" stage at the expense of another integrated stage is not likely to be rewarded.

These two arguments in favour of vertical integration are however subject to an important qualification. There are transaction costs associated with internal (firm) as well as external (market) coordination. These internal transaction costs, in the form of control loss and administrative coordinating resources, tend to grow progressively as firm size and degree of vertical integration are increased.<36> The rise in internal transaction costs due to vertical expansion will be larger the more dissimilar two stages are in terms of the managerial know-how required.<37> Ultimately a point will be

reached where "the costs of organizing an extra transaction within the firm become equal to the costs of carrying out the same transaction by means of an exchange on the open market or the costs of organizing in another firm".^{<38>} The transactions first to be integrated are those for which an internal organization represents the largest savings in transaction costs.

To a certain extent the increase of internal transaction costs can be avoided by a change of organizational form.^{<39>} Where the change of organizational form implies the creation of internal markets with divisions bargaining with each other, problems with small-numbers exchange and strategic behaviour can arise.^{<40>} Besides costly haggling over transfer prices, a likely result is that division profit will not serve as a yardstick of efficiency.

The intermediate forms of transaction modes that fall between market and full integration may capture part of the transactional advantages of vertical integration without incurring the same costs of control loss and administrative expenses. It might, e.g., suffice with a minority ownership to gain an effective influence on the decision-making of a firm in an adjacent stage. A close coordination of activities between stages can sometimes also be achieved by interfirm cooperation between firms with no common ownership.^{<41>}

2.5 Summary

Majority ownership of assets and the employment contract are chosen here as the characteristics of vertical integration as opposed to other contractual alternatives in a production chain. Vertical integration (the firm) and the market are alternative modes of organizing economic activities. Vertical integration is, by contrast with the price mechanism of the market, characterized by the ability to achieve coordination through the use of central administrative decisions. Between the two polar cases of "market" and "vertical integration" (i.e. the firm) lies a continuum of intermediate transactional arrangements such as minority ownership and different kinds of cooperative agreements.

Contact, contract and control costs are incurred in transactions between independent suppliers and customers. Small-numbers exchange and uncertainty are two factors that determine the size of these transaction costs in different contractual arrangements. Short-term contracts tend to be an inefficient mode in small-numbers exchange situations, while uncertainty increases the costs of specifying and evaluating all events pertinent to a transactional decision in a long-term contract. The problems of uncertainty in the use of long-term contracts will be accentuated if the size of the appropriable quasi-rent in a small-numbers exchange situation is large.

Vertical integration is likely to take place if intrafirm (internal) transaction costs are lower than those incurred in alternative contractual arrangements. Vertical integration offers in this case the advantages of enhanced control capabilities and harmonized profit incentives.

Notes

1. See Knight (1971, p. 254), Ståhl (1976), Jensen and Meckling (1976), Skogh (1979) and Fama (1980).

2. The concepts vertical, horizontal and lateral structure describe the degree to which input-output related activities are organized by the firm instead of the market (i.e. vertical integration), the size of the firm on a specific product market (i.e. horizontal integration) and the degree to which a firm's production consists of different products not vertically integrated (i.e. diversification or conglomeration).

3. Cf. Cheung (1983, p. 3).

4. See Cheung (1978, p. 51).

5. See Furubotn and Pejovich (1972, pp. 1139-1140) and Alchian and Allen (1974, p. 142).

6. See Casson (1982, p. 194).

7. Knight (1971).

8. By being separable into stages means that production by separate firms can actually be observed. There are otherwise some problems (at least theoretically) of defining stages in a production chain (cf. Adelman, 1955, p. 282 and McGee and Basset, 1976, p. 17).

9. See Adelman (1955), Williamson (1975, p. 83), Warren-Boulton (1978, p. 2) and Klein, Crawford and Alchian (1978, p. 299).

10. See Coase (1937), Williamson (1971 and 1975) and Cheung (1983).
11. Alchian and Demsetz (1972) are of another opinion. They argue that there is no substantial difference between an employment contract and any other kind of market contract, short-term or long-term (see p. 777).
12. Richardson (1972, p. 886).
13. See Rydén (1971, pp. 31-32), Richardson (1972, pp. 884-890), Högberg (1977) and Hägg and Johansson (eds.) (1982, Ch. 4).
14. The existence of employment contracts is taken for granted.
15. See Alchian and Allen (1974, Ch. 9).
16. See Casson (1982, p. 164).
17. Birmingham (1979, p. 18).
18. See Skogh (1973).
19. See Luce and Raiffa (1957, pp. 96-102), Birmingham (1979, pp. 18-21), Barton (1972), Klein and Leffler (1981) and Skogh (1979).
20. Cf. the discussion in, e.g., Luce and Raiffa (1957, pp. 96-102) about repeated games. In this study only products characterized by recurrent trade are considered.
21. Macaulay (1963, pp. 63-65).
22. See Williamson (1975, Ch. 2).
23. A distinction between uncertainty and complexity will not be made in the following chapters as both these factors refer to the same problem of taking a large number of events into consideration.
24. Williamson uses the word "information impactedness" in his description of the conjunction of asymmetric information and opportunism (see Williamson, 1975, pp. 31-37).
25. Klein (1979, p. 357).
26. The three conditions cited are similar to those used in the definition of pure competition in economics textbooks. For example Scherer (1970, p. 10) writes: "Homogeneity of the product and insignificant size of individual sellers relative to their market (i.e. atomistic market structure) are sufficient conditions for the existence of pure competition - the only basic structural type under which sellers possess no market power." In purely competitive markets "no individual firm finds itself able to influence the commodity's price significantly by varying the quantity of the output it sells." (Ibid., p. 9)
27. See Williamson (1979, p. 248).
28. See Williamson (1979, p. 252) and Blair and Kasserman (1984, pp. 19-20)

29. See Williamson (1981, p. 1546).
30. Monteverde and Teece (1982, p. 323).
31. See Williamson (1979, p. 241).
32. See Macaulay (1963, pp. 63-66) and Williamson (1975, pp. 106-109).
33. See Coase (1937, pp. 336-337) and Williamson (1975, pp. 4-5 and 71-72).
34. Williamson (1975, pp. 29-30).
35. See Williamson (1975, p. 29).
36. See Kaldor (1934), Coase (1937), Robinson (1958) and Williamson (1970 and 1975, Ch. 7) concerning peak coordination as an indivisible input. Given bounded rationality this indivisible input is apt to cause rising internal transaction costs if the firm grows in complexity and size.
37. See Penrose (1959, pp. 142-149).
36. Coase (1937, p. 341).

An aspect not considered further in this thesis is the effect of the Swedish tax system on vertical integration. There are some reasons for believing that a tax system like the Swedish one favours a policy for the firm where earnings (residuals) are retained and reinvested instead of paid out as dividends to the stockholders (for a theoretical discussion see Auerbach, 1983). One reason is that personal income taxes have a progressive marginal rate structure, whereas corporate income taxes are proportional. Secondly, corporations cannot deduct dividends but are otherwise subject to much more favourable deduction rules than individuals. Thirdly, realized capital gains are, if the shares have been kept more than two years, taxed at a lower rate than dividends. Consequently, if there is a choice between raised dividends and equal present value of future capital gains, the shareholder is likely to prefer the last alternative.

In the pulp and paper industry the reinvestments will, for internal transaction cost reasons, be concentrated on activities where the know-how of wood and wood processing can be used. As the domestic raw material base places a constraint on horizontal growth, vertical expansion can be expected to be favoured in reinvestments.

39. Cf. Williamson (1970 and 1975, Chs. 8 and 9).
40. See Hirschleifer (1956, p. 172), Pickering (1974, p. 60) and Williamson (1975 Ch. 8).
41. Cf. Richardson (1972) and Blois (1972).

3 THEORIES OF VERTICAL INTEGRATION

3.1 Introduction

The purpose of this chapter is to show that a transactional approach is superior to other theories of vertical integration. It is claimed that a transactional theory explains a wider range of phenomena than the different existing theories and that traditional theories can be analyzed as special cases of a more general transactional theory.

According to our transactional approach, vertical integration is an institutional response to a transactional situation characterized by uncertainty and small-numbers exchange. It will be demonstrated in this chapter that various traditional theories differ only in the description of the causes of a small-number exchange situation.

The analysis is restricted to showing how traditional theories of vertical integration with special relevance to the Swedish pulp and paper industry are related to each other and can be included in our transactional theory. The first two, bilateral monopoly and technological interdependency, are studied in Sections 3.2 and 3.3. Section 3.4 considers a third, less developed, class of theories concerning the sensitivity in company profits to variations in output demand and input supply. Section 3.5 offers concluding remarks.

3.2 Bilateral Monopoly

During the last thirty years, a large part of the literature on vertical integration has viewed vertical integration as a strategic response to prevailing monopoly or monopsony power in a market.<1> It is argued that in cases of successive monopolies and bilateral monopolies, joint profit might be increased by vertical integration.<2> Whether fixed or variable proportions between input and output are assumed plays a crucial role when analyzing the profitability of an integration between a monopolist and all firms in a succeeding competitive stage. Bork (1951, pp. 196-198) showed that under the assumption of fixed proportions it is not possible to earn more than one monopoly profit in a production-distribution chain. In a

later article Vernon and Graham (1971) showed that if there are variable proportions, vertical integration by a monopolist with a downstream industry can increase joint profit.

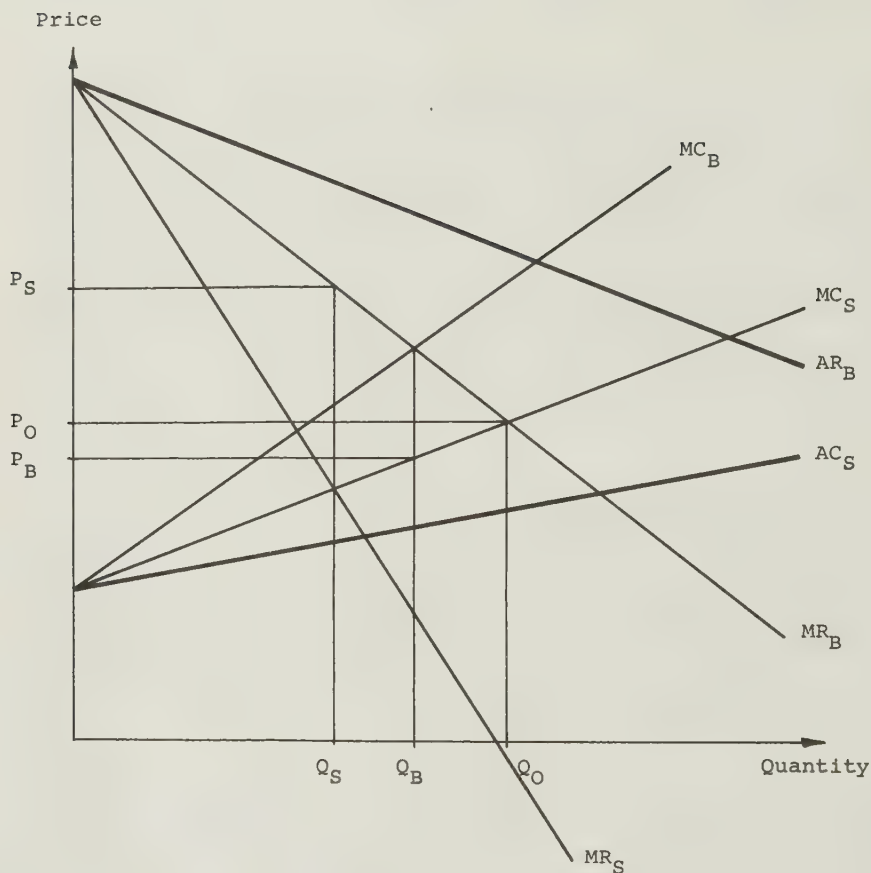
A classical motive for vertical integration is to negate the effects of a cartel on price and output.<3> The existence of a cartel, for instance in a raw material market, is a motive for customers to integrate backwards by merger or by internal expansion (see Section 8.2.2 on Bowater's purchase of a pulp mill in Sweden). The acquisition price for a firm in the raw material stage is not likely to be a deterrent as each cartel member only gets a share of the cartel profit. After the merger, the integrated firm can put a downwards pressure on the cartel price by an increase in its raw material production and may also from the larger output be able to increase the profit of the merged firm.

3.2.1 The Traditional Approach

The bilateral monopoly model is of special interest in this study as it does represent an extreme small-numbers exchange situation with only one seller and one buyer in the market. The model has also been used in descriptions of the working of the Swedish roundwood market.<4>

To illustrate the incentives for vertical integration in a bilateral monopoly situation it is helpful to use a graphical presentation. Consider a market for a raw material such as roundwood. A buyer B , who uses the raw material in the production of an output, is interested in purchasing the input (raw material) as long as its price (P) is less than the marginal value of the input in production (MR_B) (see Figure 3.1). The marginal revenue curve for the buyer MR_B therefore constitutes the demand curve of the monopolistic seller S (i.e. $MR_B = AR_S$). The marginal revenue curve of the seller will consequently be marginal to MR_B (i.e. $MR_S = MMR_B$). As there are two marginal revenue curves, there are also two marginal cost curves. MC_S shows the seller's marginal cost of producing and delivering the good, while MC_B shows the cost of the input to the buyer, when he takes the influence of his buying decisions on the price into account (i.e. $MC_B = MMC_S$ and $AC_S = MC_B$).

Figure 3.1 Bilateral Monopoly



As both the seller and buyer regard themselves as price-setters, they strive towards disparate profit-maximizing positions. The buyer will try to equate his marginal cost MC_B with his marginal revenue MR_B and establish a price P_B while the seller wants to equate MR_S and MC_S and set a price P_S . Both these positions (P_B , Q_B and P_S , Q_S respectively) correspond to joint profits that are less than the maximum. The

maximum joint profit of the two stages is arrived at the quantity Q_0 where the "true" marginal revenue $MR=MR_B$ is equal to the "true" marginal cost $MC=MC_S$.<5>

The fact that the seller and the buyer strive towards different combinations of prices and quantities, makes the outcome indeterminate. It is necessary to bargain about price and perhaps also about quantity. If the price is the only parameter that is negotiated, it is only by chance that a joint profit-maximizing price P_0 will be agreed upon. What the price and quantity actually will be depends on relative bargaining strengths. If the buyer is strongest a price close to P_B will be established and if the seller is strongest a price close to P_S will be set.

It is in the interest of both parties, however, that the joint profit-maximizing position be reached. At the quantity Q_0 there will be the largest possible profit to share between the two parties. One way to make sure that a joint profit-maximizing position is reached is to contract for the profit-maximizing quantity Q_0 and let price-bargaining decide how the joint profit is to be shared.<6>

The extreme results of price negotiations in a price-quantity agreement are a price P equal to AR_B which implies that the buyer receives no gross profit (all quasi-rents appropriated by the seller) or a price P equal AC_S which implies instead that the seller gets no gross profit (all quasi-rents appropriated by the buyer).

Another way to make sure that a joint profit-maximizing position is attained is to integrate vertically. The producer and the consumer of the raw material will then be joined within the same firm. The MC- and MR-curves will no longer be distorted because of market power. The marginal cost for the integrated firm will thus be equal to MC_S and the marginal revenue equal to MR_B . The profit-maximum of the integrated firm corresponds to the point where MC_S is equal to MR_B , which is also the point of joint profit-maximization.

3.2.2 The Transactional Approach

The traditional theory of bilateral monopoly does not, however, explain why vertical integration is chosen instead of a contract on Q_0 and a profit-sharing price.

If it is less costly to negotiate and enforce a merger agreement than to have a system of contracts between independent traders, vertical integration will be preferred to price-quantity contracts. What speaks for vertical integration as the most efficient mode is that in order to be able to contract for the profit-maximizing quantity Q_0 , it is important that the seller can estimate the "true" marginal revenue (MR_B) and that the buyer can estimate the "true" marginal cost (MC_S). A problem here is that the relative bargaining position might be strengthened for the buyer if the "true" marginal revenue is not revealed and for the seller if the "true" marginal cost is not revealed. The parties negotiating a price-quantity contract are therefore facing a prisoners' dilemma type of problem where the joint payoff will be the largest if the "true" conditions are revealed, but where also the individual payoff will be the largest if "false" conditions are revealed, given that the other party is honest. The probable outcome of such a situation is that "false" conditions will be stated by both parties. In other words, uncertainty creates a bargaining situation with an asymmetrical distribution of information about trading conditions that makes strategic and opportunistic behaviour viable (cf. Section 2.3.2). Ultimately, the negotiation costs rise to a level that "eliminate the potential gain which is the object of the bargaining".<7>

Furthermore, uncertainty about future trading conditions makes it prohibitively costly to draw up a long-term contract that covers all contingencies. Enforcement costs are also likely to be high, as each party has an incentive for appropriating an additional part of the joint quasi-rent by breaching, misinterpreting or reneging on the long-term agreement by stating new "false" demand/supply conditions that are difficult to check.

The advantage of vertical integration is that the supplier and the user, unified by common ownership, do not have any pre-emptive claims on the joint profit-stream and will therefore be more inclined towards disclosure of "true" marginal costs and revenues.

In the case of a stationary and thus certain environment where contracts can be enforced effectively at a low cost, it is difficult to see any advantages of a merger agreement over contracts for purchase of inputs or sale of outputs. In a merger an agreement has to be made on the valuation of assets, while in other contracts settlements on price-quantity of input are required. Costly haggling about the division of joint profit is as likely to occur in both the cases. The only difference is that the haggling will be about asset valuation instead of input price. A priori, there are no reasons why these negotiation costs in a "stationary environment" should be lower in a merger agreement than in once-for-all or recurrent contracts in the input markets.

In an actual market, such as the wood market, marginal cost and marginal revenue conditions are changing continuously. It is therefore difficult and costly to draw up a once-for-all contract that covers all contingencies. In the case of recurrent contracting the bargaining situation will be changing all the time. In a merger agreement it is only the present value of expected future profits that has to be evaluated.

A merger agreement represents therefore, in the case of an uncertain environment, a saving in transaction costs, since the problems of setting up and enforcing a more or less complete once-for-all contract and the high negotiation costs associated with recurrent contracts are avoided.

To sum up, it is primarily in an uncertain environment that there will be clear transactional advantages associated with vertical integration compared to other contractual alternatives. The more uncertain the environment and the larger the bargaining area, the larger will the transactional advantages with vertical integration be compared to alternative contractual arrangements.

3.3 Technological Interdependency

One of the most cited rationales for vertical integration is technical interdependency between successive stages. The standard case described in the literature is integration between iron- and steel-making. This example is quoted by a number of writers such as Lavington (1927, p. 32), Jewkes (1930, p. 625), Dennison (1939, p. 254) and Bain (1968, pp. 177 and 381). Bain (1968, p. 177) describes thermal savings in the following way: "the integration of making pig iron, converting iron into steel, and shaping of steel into semifinished products - all in a single plant - permits considerable savings in the total fuel requirement for heating the iron and the steel. If all functions are performed in a single plant, neither the pig iron nor the steel ingots have to get cold before passing to the next productive process".

A direct parallel can be drawn to the technical integration of pulp and paper production in the same plant, whereby the pulp does not have to be dried and rewet before being used as input in the paper production. By avoiding drying and rewetting the pulp and using surplus heat from the pulp mill in the paper stage considerable savings in fuel are possible (see Section 6.5). Similar cases of technical interdependencies can also be found in other flow process operations, e.g., in the chemical industry. However, the technical interdependency between pulp and papermaking has not been observed as often in the economic literature as examples from the iron and steel industry and the petroleum industry.

Besides thermal savings, there are savings in the handling of intermediate products (wrapping, unwrapping, intermediate storage etc). There can also be savings in transportation costs by having a succeeding function performed in the vicinity. The profit from having oil refining joined with crude oil production through a pipe-line is the reduction in transportation and handling costs that can thereby be achieved.<8>

In the pulp and paper industry major savings are in the handling of the intermediate product, pulp. Activities such as drying, cutting, baling, rewetting and defibrizing the pulp are eliminated by technical integration. Technical integration is also common between tissue

paper production and conversion of tissue paper. The main reason for this technical integration is savings in transportation costs (see Section 8.4).

3.3.1 The Traditional Approach

Technological interdependency has been claimed to be the most obvious reason for vertical integration. To cite Bain (1968, p. 381) "when integration does not have this physical or technical aspect . . . the case for cost savings from integration is generally much less clear". Bain does not, however, base his statement upon a comparison between alternative institutional schemes.

In the absence of transaction costs there is no hindrance to separate ownership of, e.g., the blast furnace and rolling mill stages in the integrated iron and steel plant. The transactions between the two stages could from the time of the erection of the integrated plant be regulated through a long-term contract that covered all contingencies. This long-term contract could be the result of a competitive process with many bidders for ownership of the iron and steel stages. If the traditional analysis is to be extended to answer the question as to why vertical integration is chosen instead of, e.g., a long-term contract, the transaction costs of the different institutional arrangements have to be considered.

3.3.2 The Transactional Approach

It is the coexistence of transaction-specific capital and uncertainty of demand/supply conditions that determines the choice of contract. In order to take advantage of thermal, handling and transport economies, activities in succeeding stages have to take place in close proximity to each other. From this uniqueness of location arises a type of asset specificity named site specificity that has implications on post-contractual costs.<9>

By asset specificity is meant that the equipment in adjacent stages is connected through pipe-lines or other coupling devices and that the value of the physical capital is low in alternative uses. A paper machine is to be used for papermaking and blast furnace for ironmaking etc. As pointed out in Section 2.3.4, asset specificity creates an appropriable quasi-rent equal to the portion of the quasi-rent that is in excess of the value to the second highest valuing user.<10> In the case of site-specificity the appropriable quasi-rent is determined by the benefits of proximity in location and the costs of eventual decoupling devices (see Section 6.5.4 concerning appropriable quasi-rent in technical integration between pulp and paper).

When a site-specific investment such as technical integration has been made, the parties are locked into a bilateral exchange situation. Within a price-area equal to the appropriable quasi-rent there are no alternative suppliers and customers. At the outset "there may be many potential suppliers of a particular asset to a particular user" but once the investment has taken place the situation is transferred to one of small-numbers exchange.<11> Without an initial long-term agreement that promises at least a normal rate of return on funds invested, it is clear that there would be no investment in a technically integrated plant. The transaction costs to consider are the costs of enforcing the initial agreement and the high negotiation costs of new agreements.

Even if a well-specified long-term contract has been drawn up, uncertainties in demand/supply conditions can be used by the parties in a opportunistic way to get as large share as possible of the appropriable quasi-rent (the bargaining area). (As an example of the problems that can arise in technical integration between pulp and paper see Section 6.5.4). Vertical integration represents here a way to harmonize profit incentives. The prediction to be made, *cet. par.*, is that "integration by common or joint ownership is more likely, the higher the appropriable specialized quasi-rents of the assets involved".<12>

To sum up, the traditional analysis considers only the savings in transportation and production costs that can be achieved by technical integration. The question why these cost savings cannot also be obtained by contracts is not answered. In a transactional approach the

analysis is expanded to take into account the transactional reasons for vertical integration. As in the bilateral monopoly case, it is the coexistence of a bargaining area and an uncertain environment that motivates vertical integration. The larger the bargaining area and the greater the uncertainty, the more advantageous will vertical integration be, *cet. par.*

Hence, technological interdependency and bilateral monopoly can be analyzed by the same transactional theory of small-number exchange and uncertainty. The small-numbers exchange situation gives rise to a bargaining area in the form of an appropriable quasi-rent. Uncertainty makes opportunistic behaviour viable as a means of obtaining as large a share of the appropriable quasi-rent as possible. The transaction costs of contractual relationships relative to vertical integration are thereby increased.

3.4 Sensitivity to Variations in Output Demand and Input Supply

3.4.1 High Quasi-Rents and Site Specificity

A third class of traditional theories to be considered is vertical integration as a means of assuring output demand and input supply. Besides using the transactional approach, our study is in this context unique in its stress on differences in quasi-rents due to transportation costs as a factor of special importance.

Assured demand and supply as an integration incentive, especially for firms exhibiting economies of scale, is recognized by business economists such as Thompson (1967) and Porter (1980) and is mentioned in a standard textbook in industrial organization; Scherer (1970). Swedish studies of vertical relations in the Swedish forest industry by Kinch (1974), Brege (1979) and Forsgren and Wictorin (SOU 1981:43) also recognize assured demand as an incentive for vertical integration.

It is, however, primarily in extensive historical studies of large successful enterprises that assured demand/supply has been advanced as an integration incentive for high fixed cost firms. A representative of this line of research is Chandler (1977). In his book, The Visible

Hand, large successful American enterprises during the period 1880-1940 are examined.

The establishment of the railroad and telegraph system in the 19th century opened up large markets and made it possible to adopt techniques relying on mass production and mass distribution. The implications of this were that: "As the new mass production industries became capital-intensive and management-intensive, the resulting increase in fixed costs and the desire to keep their machinery or workers and managerial staff fully employed created pressures on the owners and managers to control their supplies of raw and semifinished material and to take over their own marketing and distribution".^{<13>}

It is notable that this strategy of backwards and forwards integration was most successful in "high-volume, large-batch, or continuous-process industries and in those needing specialized service".^{<14>} The pulp and paper industry fits well into this description as it uses large-batch and continuous-process methods of production.^{<15>} There is, however, no large demand for specialized marketing services in the pulp and paper industry, as it is mostly producer and not consumer goods that are produced and the products are standardized in most instances.

Chandler's works have inspired Moss (1981), who refers to break-even analysis in his explanation of the importance of an assured supply of inputs and assured demand for output in high fixed costs industries. Concepts such as the break-even point and operating leverage are useful in calculations of the sensitivity of a high fixed costs industry to variations in the operating rate.^{<16>}

The real issue is, however, the existence of high quasi-rents due to high fixed costs (for a definition of quasi-rent see Section 2.3.4, p. 14). Unlike rents, quasi-rents disappear in the long run as inputs become variable. Disregarding a foregone rate of return on salvage values, value of plant site and working capital, the size of the quasi-rent in a firm with specialized assets is equal to fixed costs plus pure profit (or total revenue minus total variable costs or gross profit of the firm).^{<17>}

In a capital-intensive industry such as pulp and paper with specialized capital assets the proportion of total costs that is a quasi-rent at full capacity utilization is high compared to other industries. The prices of pulp and paper can consequently be bid down to low levels without ceasing production.<18>

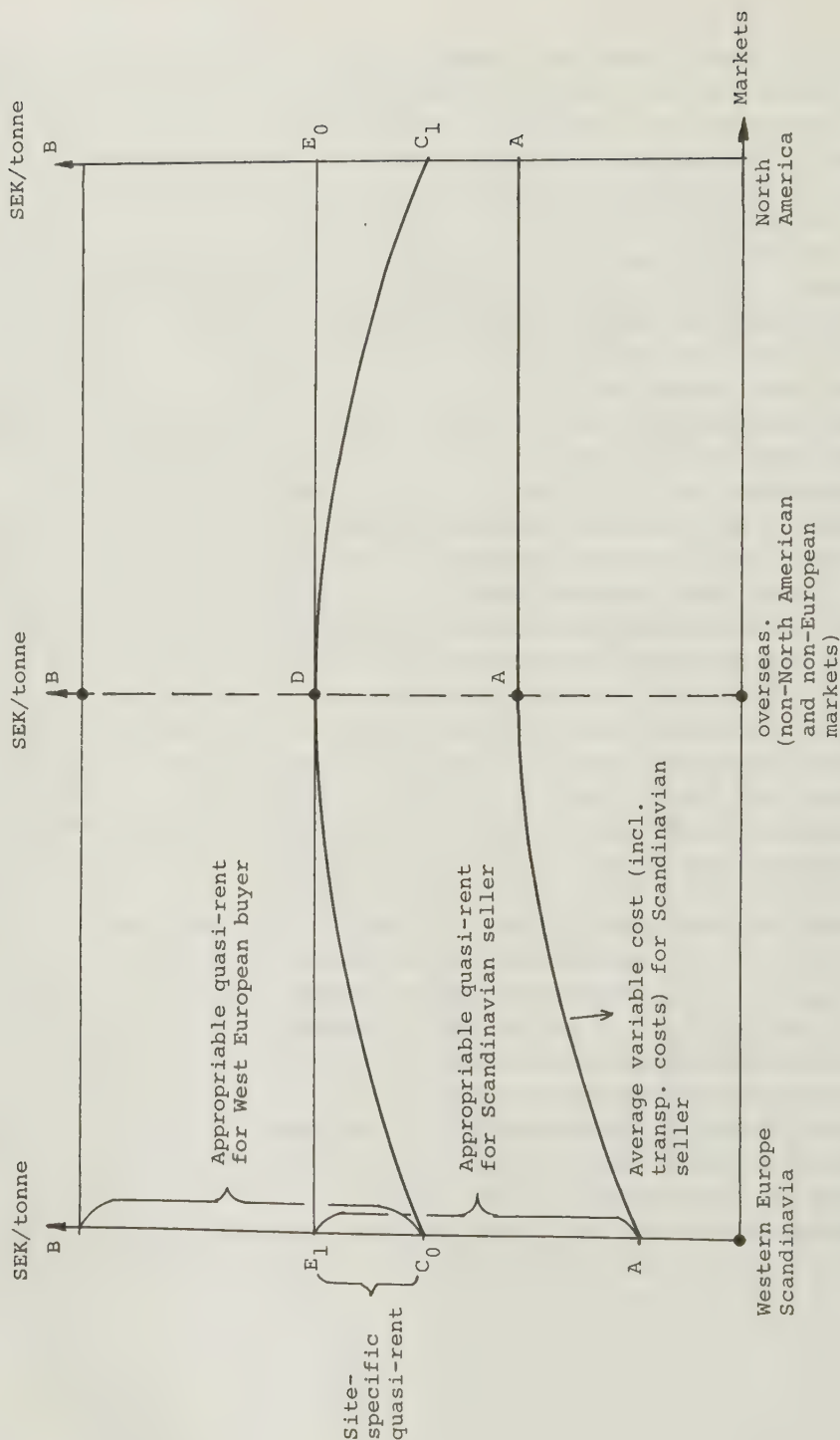
The size of the quasi-rent is dependent on operating rates as well as on unit gross profits. The higher the operating rates and the unit gross profit, the higher will the quasi-rent be.<19>

High fixed costs are associated with economies of scale. The Swedish pulp and paper companies are of large size compared to the domestic input and output markets. The low value relative weight and bulk for wood and many pulp and paper products makes transportation costs important in extended geographical market penetration. The ratio of transportation costs to value tends to be higher the closer a product is to the raw material source in a production chain. This ratio is therefore higher for pulpwood than pulp and in most instances also higher for pulp than paper.<20>

Market power and relatively high ratios of transportation costs to product values make part of the quasi-rent in nearby trade site specific and appropriable. Figure 3.2 illustrates how site specificity in nearby pulp and paper trade for Scandinavian producers influences quasi-rents. The assumptions behind the graph are:

- a) that there are two suppliers in the international trade, Scandinavian and North American, and three markets, Western Europe (W. Eur.), overseas and North America (N. Am.). For a North American supplier the home market is "nearby" and the other two "distant", while W. Eur. is "nearby" and N. Am. and overseas are "distant" for a Scandinavian supplier.
- b) that there are no differences in transportation costs in trade between N. Am.-W. Eur., N. Am.-overseas, Scand.-N. Am. and Scand.-overseas
- c) that transportation costs are paid by the producer (seller)

Figure 3.2 Site-Specificity and Appropriable Quasi-Rents in Nearby Trade.



- d) that the maximum price that can be charged in the short run (i.e. the price that make buyers' quasi-rents equal to zero) is the same for all buyers on "nearby" and "distant" markets.
- e) that price is competitively determined in the overseas market

In the figure the B-B-curve shows the price level at which the buyer receives no quasi-rent and the A-A-curve shows the prices at which a Scandinavian seller receives no quasi-rent. The joint quasi-rent of buyer and seller in Scandinavian sales in the three different markets is represented by the vertical distances between these two curves. The joint quasi-rent in Scandinavian nearby trade exceeds that obtained in the "distant" markets by an amount equal to the difference in transportation costs of serving these other two markets. In the lines C_0DE_0 and C_1DE_1 , the point D represents the price obtained by Scandinavian and North American sellers in the competitive overseas market, $E_0 (=D)$ is the price demanded by a Scandinavian supplier in alternative distant sale in the North American market. By the same token $E_1 (=D)$ is the price demanded by a North American supplier in alternative distant sale in the West European market. C_0 and C_1 are equal to the overseas price D net transportation costs. In the West European market the price demanded by a North American supplier (E_1) sets a limit to the part of the joint quasi-rent that a Scandinavian seller can appropriate. For a West European buyer, in turn, the price offered in Scandinavian sales in the overseas market net of transportation costs (C_0) sets a limit to the part of the joint quasi-rent that can be appropriated in nearby transactions. The difference between E_1 and C_0 then determine the size of the bargaining region (the site specific quasi-rent) in nearby trade in the West European market.

3.4.2 Cyclical Patterns

Transportation cost advantages thus bring forth higher quasi-rents in trade on nearby than on distant markets. In a cyclical industry such as pulp and paper the conditions of input supply and output demand vary widely. As a consequence the power of buyers and sellers in the division of the joint quasi-rent also changes between the boom and recession phases of the business cycle.

Boom. During a boom there is a sellers' market in the sense that both Scandinavian and North American pulp and paper producers are able to fill capacity with orders from nearby markets even if price is considerably increased. On more distant markets such as in Asia, the buyers must, in order to attract deliveries offer mill prices (i.e. prices net of transportation costs), that are at least as high as those obtained on nearby European and American markets.

There is also a sellers' market on the domestic wood market. Shortages of domestic wood at the ruling price level can occur. Four different ways for a pulp and paper company to meet such shortages in a market of a spot character are: (1) to increase domestic wood prices, (2) to be passive and lose orders, (3) to keep large pulpwood inventories and (4) to import wood.

The profitability of a strategy of price increases on the domestic wood market is dependent on the elasticity of the wood supply. The more inelastic the domestic wood supply is for the pulp producer, the more unprofitable it is to raise the wood price. In addition to a high concentration on the domestic wood market by purchasing cartels, the expectations of rising wood prices make the supply especially inelastic during booms. Price elasticity is also influenced by the way wood transactions are organized. The larger the share of the wood transactions that are internalized by vertical integration and regulated through long-term contracts, the more inelastic will the supply be for a company that has to rely on spot market purchases.

The alternative of being passive and losing orders because of a shortage of wood also has disadvantages. The profit of a high fixed cost firm is sensitive to changes in the operating rate <15>. The production of the last tons close to full capacity utilization has an especially large impact on profitability as average costs are lowest for this production.

A third alternative is to keep sufficiently large pulpwood inventories at the mills. One problem with this strategy is the difficulty in forecasting future demand. Furthermore, the inventories also tie up capital with even higher fixed costs in the form of interest and amortization as a result. There are also costs of storage and deterioration.

A fourth alternative is to import wood. Primarily because of transportation costs, the mill cost for such a purchase will be higher than the mill price paid for domestic wood. This fourth alternative can, however, still be the most profitable as far as it is a marginal purchase that does not influence average domestic price. The more inelastic the domestic supply, the more profitable is the fourth alternative compared to an increase of the domestic price.

Recession. During a recession a buyers' market arises. Even at very low prices compared to those prevailing during booms, the demand from nearby markets is not large enough to give high operating rates in the pulp and paper mills. For the sake of higher operating rates, sales on more distant markets such as, e.g., Asia are now more interesting for both Scandinavian and North American producers. These sales are profitable as long as the mill price exceeds marginal costs (which are low in capital-intensive pulp and paper mills during recessions). On the West European markets there also tend to be marginal North American shipments that press down the price level.

For a Scandinavian pulp and paper company that encounters a sudden loss of orders on a nearby market during a recession, the four different ways to react on a spot market are: (1) to cut price, (2) to be passive and experience reduced operating rates, (3) to produce for stock and (4) to sell on an overseas market.

To cut price on a nearby West European market is an unattractive strategy because the demand is inelastic for Scandinavian companies, since (i) the aggregate short-run demand elasticity is low, (ii) market shares are larger here than on overseas markets and (iii) rivals' reactions are rapid. <21> Vertical integration and widespread use of long-term contracts also reduce the elasticity. A likely outcome of a price cut is therefore just a minor increase in demanded quantity with a lower revenue for the firm.

Reduced operating rates are an especially unprofitable alternative for a high fixed cost pulp and paper company <16>.

To keep up operating rates at the ruling price level by producing for stock implies higher fixed costs in the form of interest and amortization. Furthermore, there are no immediate contributions to fixed costs from stocked units. For companies with a high debt ratio this will increase the risk of a financial crisis. There are also storage and deterioration costs.

The advantage of the fourth alternative is that prices are cut on occasional orders on oversea markets without having to influence average price on the nearby markets where most sales are made.<22> Even if the mill price from this overseas order is much lower than could be obtained on a nearby market, the smaller impact on the overall price level can imply a higher marginal revenue. The more inelastic the demand on nearby markets, the more profitable will the fourth alternative be compared to the first.

Prediction. Provided that the fourth alternative represents the most profitable strategy, the prediction is that during recessions the quantity of pulp and paper sold overseas is likely to increase and the mill price overseas to be substantially below the mill price on nearby markets. During booms the reverse situation is likely to prevail, with mill prices overseas that can be even slightly higher than mill prices nearby and a reduction in the quantity sold overseas.

3.4.3 Transactional Analysis

It has been shown earlier that bilateral monopoly and technological interdependency can be analyzed by the same transactional theory emphasizing small-numbers exchange and uncertainty with a bargaining area inviting to strategic and opportunistic behaviour in a contractual relation. How does this transactional approach encompass the phenomena described in this section?

There is in this case small-numbers exchange due to site specificity. A situation of site specificity exists in the sense that transportation advantages can be reaped in trade between nearby suppliers and customers. The unit gross profit tends therefore to be higher in this trade. Market power is also present as it is possible for a company to influence the price level on a nearby market by

variations of its sale of outputs or purchase of inputs i.e. there is no pure competition. With fixed proportions between input and output, this inelasticity of input and output prices makes the unit gross profit dependent on the operating rate. There will be a trade-off between high unit gross profits and high operating rates that has an especially large impact on profit in high fixed cost firms such as pulp and paper companies.<16>

The character of the small-numbers exchange situation faced by, e.g., a pulp and paper company varies over the business cycle. During a boom, there is a small-number exchange situation on the nearby wood market. The risk increases for shortages of domestic wood at the ruling price level. Because of the inelasticity of domestic supply, wood import at a higher mill price than the domestic may be a profitable strategy in such a situation.

During a recession, the small-numbers exchange is encountered instead on the nearby output markets. Frequently, the inflow of orders at ruling prices is not large enough to allow full capacity utilization. Instead of price cuts on nearby markets, where the short-run price elasticity is especially low, the most profitable strategy may be to export to overseas markets.

As pointed out in Section 2.3, a short-term contract is mostly an inefficient transaction mode in a small-numbers exchange situation. Traders want then to protect their quasi-rents through some kind of long-term agreement. In this case, the seller will profit during recessions from such an agreement while the buyer will profit during booms.<23>

A long-term contract is one way to assure demand/supply through more stable trading relations on nearby markets. The alternative is to tie supplier and user to each other by ownership, minority or majority (i.e. vertical integration). The question to be addressed here is why cannot demand and supply always be secured just as well by long-term contracts as by vertical integration? The answer is to be found in the different control and planning capabilities and incentives that these two types of institutional arrangements imply.

The efficiency of a long-term contract is hampered by the coexistence of uncertainty and small-numbers exchange. The higher the degree of uncertainty about future market conditions, the more important it is to act with flexibility in response to changes in the market situation and the more costly it is to negotiate and enforce long-term contracts.

In an uncertain market spot prices, for instance, fluctuate widely, which makes it costly to negotiate and enforce prices that are valid for a longer time period. The more the spot price deviates from a price in a long-term contract, the more costly it is to enforce the contract. During a recession it can thus be advantageous for a buyer to find an excuse for not adhering to already contracted quantities and instead to buy these quantities more cheaply on the spot market (e.g. from a temporary North American supplier on the West European pulp and paper market).^{<24>} Alternatively, the lower prices quoted in spot sales can be used as an argument in renegations of prices in a long-term contract. If the price reduction can be made in the form of a secret rebate this is more profitable for the seller than losing an order on a nearby market.

By the same token it might be profitable for the seller during a boom to find an acceptable excuse for shifting deliveries to spot market customers that offer a higher mill net price or try to raise the prices for already contracted quantities. If a price increase can be made for just a marginal quantity on the nearby market, this alternative can be attractive for the buyer.

The size of the appropriable quasi-rent or bargaining area in contractual renegotiations is dependent here on the costs associated with the most favourable of the four alternatives: (1) make an official price change, (2) be passive, (3) adjust inventories and (4) trade elsewhere. If sales (purchases) on distant markets is the most profitable of the four alternatives above in a shortage situation, the bargaining region for secret rebates (premiums) on a nearby market can be defined as the difference between mill prices on nearby and distant markets.

To prevent opportunistic strategic behaviour of the kind accounted for above is difficult in a contractual relation on a market characterized by uncertainty, as it is prohibitively costly or infeasible to specify all contingent claims in a long-term contract. Long-term contracts are therefore apt to be more or less incomplete as is the case for, e.g., pulp and kraftliner. There are also problems both in interpreting contract terms and verifying whether claimed events really have occurred or not. Finally, it is costly to use courts or arbitration for enforcing the contracts.

By vertical integration, a pulp or paper producer gets a possibility to influence directly the choice of supplier and raw material in the succeeding stage. An integrated converter can simply be ordered to use more internally supplied raw material. During recessions this is especially profitable as the differences in contributions on nearby and "overseas" markets then are at their largest. Falls in profits can be prevented by inducing integrated users on high contributing markets to consume proportionally more internally supplied pulp and paper. Furthermore, demand variations caused by inventory speculations can, for both incentive and control reasons, be alleviated in a vertically integrated firm.

The propensity to secure demand by vertical integration will be especially high if the number of independent buyers is successively diminishing due to integration by competitors. It will then become increasingly difficult for an unintegrated supplier to compensate for the loss of orders from one customer with new orders from another customer.

To sum up, the profits of high fixed cost firms operating on oligopolistic (imperfectly competitive) cyclical markets with low short-run price elasticity are especially sensitive to variations in demand/supply. In certain markets the contributions to fixed costs and profits tend to be higher, primarily due to comparative transportation advantages. For the capital-intensive Swedish pulp and paper company it is important even if the firm is risk-neutral to assure demand/supply on these markets.<25> Two alternative ways of assuring demand/supply on these markets are vertical integration and long-term contracts. The advantages of vertical integration are harmonized profit incentives and better control capabilities. Vertical

integration will be especially attractive if the number of independent buyers/sellers in the market is shrinking. Eventually this turns into a bilateral monopoly with one buyer and one seller.

We have thus the same transactional situation as in bilateral monopoly and technological interdependency, i.e. small-numbers exchange and uncertainty that invite opportunistic bargaining. A difference is that it is only one side of the market that faces a small-numbers exchange problem at any one time, the buyer during booms and the seller during recessions. But seen over a business cycle it is also small-numbers exchange on both sides of the market in this case. Thus we can include this case too under our general theory.

3.5 Concluding Remarks

The approach taken in this study builds upon Coase (1937) and Williamson (1971 and 1975) in considering vertical integration as part of a theory of choice of transactional arrangement. Vertical integration is one of several ways of organizing transactions in a production-distribution chain. The choice of institutional mode is determined by the transaction costs of using alternative institutional arrangements.

Necessary conditions for vertical integration to represent a more efficient transaction mode than market contracts are the coexistence of small-numbers exchange, which implies an appropriable quasi-rent, and uncertainty. Under the assumptions of uncertainty and small-numbers exchange, our theory of vertical integration can be summarized as:

The larger the bargaining area (appropriable quasi-rent), the greater the degree of uncertainty of a transaction, and the lower the rise in internal transaction costs, then the more profitable vertical integration will be compared to other contractual arrangements, ceteris paribus

It is claimed here that the different motives for vertical integration can be analyzed according to this theory.

Without a small-numbers exchange (i.e. in pure competition) there would be no bargaining area at all. The knowledge that there are alternative traders prepared to buy and sell the same good at a given price makes price negotiations non-viable and lowers the enforcement costs in market exchanges.

Uncertainty, in turn, invites opportunistic behaviour in a small-numbers exchange situation. It is then difficult (i.e. costly) for the parties to disclose if the conditions stated by the transacting partner are true or false. Without uncertainty (or complexity), opportunistic behaviour would be unprofitable for parties engaged in repeated trade. Further trading would either be impossible or have to be undertaken at terms that are to the disadvantage of an opportunistic trader. The incentives for a trader to try to change contract terms ex post or take advantage of loopholes in a contract to his/her advantage will then be lessened, thereby negotiation and enforcement costs are lowered. Finally, similarity in know-how implies that the rise in internal transaction costs due to vertical integration will not be so high (see Section 2.4).

Notes

1. A review of the earlier literature of bilateral monopoly is provided by Machlup and Taber (1960).
2. See Hawkins (1950), Machlup and Taber (1960) and Singer (1968, pp. 211-212).
3. See Stigler (1951, pp. 137-138).
4. See Wohlin (1970, Ch 7) and Lönnstedt (1977, Appendix B).
5. See Kuotsoyiannis (1979, pp. 189-191).
6. See Machlup and Taber (1960, pp. 282-284).
7. Johansen (1979, p. 520)
8. See Teece (1976, pp. 115 and 123).

9. See Williamson (1979, p. 242 and 1981, pp. 1546-49).

10. See Klein, Crawford and Alchian (1978, p. 289).

11. See Klein Crawford and Alchian (1978, p. 299).

12. Klein, Crawford and Alchian (1978, p. 307).

13. Chandler (1977, p. 282).

14. Chandler (1977, p. 338).

15. Of the seven largest American paper companies between 1900 and 1907 with assets of 20 millions US dollars or more, five produced newsprint and heavy kraft products (ie the paper grades with the largest economies of scale) (see Chandler, 1977, p. 354) These five companies were all backwards integrated with forestry and had extensive marketing organizations. The other two companies were not as successful as these five. They had a broader line of products with less economies of scale in production and were not integrated backwards.

16. The break-even point is the quantity point where total revenue is equal to total costs for a firm or a plant. The algebraic solution to the break-even point (see expression 3.1 below) shows that the higher the fixed costs (FC), the higher the output level that is needed to generate revenue enough to cover total costs

$$(3.1) \quad Q = FC / (P - AVC) \quad (\text{see Weston and Brigham, 1978, p. 73})$$

where: P=Price
Q=Quantity
FC=Fixed Costs
AVC=Average Variable Costs

It is therefore more important to keep a high operating rate in high fixed costs industries than in low fixed costs industries (see Weston and Brigham, 1978, pp. 76-77). The break-even quantity will also be more sensitive to changes in the contribution to gross profit per unit (i.e. to changes in P-AVC), the higher the fixed costs are

The operating leverage (see expression 3.2) shows how sensitive the profit level is to changes in the output level.

$$(3.2) \quad \text{Operating leverage at point } Q = \frac{(PQ - VC)}{(PQ - VC - FC)} = \frac{Q(P - AVC)}{Q(P - AVC) - FC}$$

(see Weston and Brigham, 1978, p. 79)

The higher the fixed costs (FC), the higher will the operating leverage be. The operating leverage is also more sensitive to changes in the contribution per unit (i.e. changes in P-AVC), the higher the fixed costs are.

These two expressions show the sensitivity of profitability to changes in the output level (Q), the output price (P) and the input prices reflected in the average variable costs (AVC). Variations in the demand for the output and the supply of the inputs have larger effects on profitability in high fixed costs than in low fixed costs industries whether the variations are in quantity or in price.

17. See Salter (1969, pp. 56-57), Klein, Crawford and Alchian (1978, p. 298) and Kuotsoyiannis (1979, pp. 474-475).
18. Cf. the discussion in Salter (1969) on pp 61-64 about quasi-rents.
19. Quasi-rent = total revenue (TR) - total costs (TC) = $Q (P - AVC)$
where: Q = quantity or operating rates times capacity
 $P - AVC$ = price minus average variable cost or unit gross profit
20. The per volume costs of transporting wood in the most economic way as woodchips are about twice that of transporting woodpulp (Eklund, 1977).
21. In a study by FAO (1977, p. 16) the short-run price elasticity of aggregate demand for paper in high income countries has been estimated at around -0,2.
22. See, e.g., Scherer (1970, pp. 262-267) on geographic price discrimination.
23. To assure continuity in supplier-user relations in these ways will be especially important if there are also advantages of repeated trade and if the trading partner accounts for a large portion of supply or demand. By transacting repeatedly with the same partner search costs are lowered and advantage can be taken of the human capital represented by transaction specific knowledge of personal characteristics, technology and organizations. A sudden discontinuity in the trading relations with a large supplier/customer causes large difficulties in maintaining the operating rate and high costs of new contact and contract making activities.
24. During booms the opposite situation is common with non-regular customers prepared to pay extra-high prices to get a delivery.
25. It is not just the variance in profits during a business cycle that is reduced by an assured supply of inputs and assured demand of outputs. Average profit will also be increased, as the firm is able to keep high operating rates with supplies and orders from the highest contributing markets during the different phases of a business cycle.

PART II. THE CASE OF THE SWEDISH PULP AND PAPER INDUSTRY

4 INTRODUCTION

In this part, which consists of Chapters 4 to 8, we confront our transactional theory of vertical integration (as summarized in Section 3.5) with data from the Swedish pulp and paper industry. Before doing this, the different elements of the theory have to be sorted out and operationalized.

A key factor of the theory is the concept quasi-rent (as defined in Sections 2.3.4 and 3.4.1). Quasi-rent is dependent on the size of fixed costs and pure profit. The pulp and paper industry is capital-intensive with large sums invested in physical capital that in the short run cannot be withdrawn from its present use and transferred to other uses. In Sweden labour costs have also, to a large extent, the character of fixed costs, at least in the short run perspective of a quarter to a year.<1> High fixed costs in the pulp and paper industry imply that prices can be bid down to low levels without affecting short run production decisions.

The appropriable part of the quasi-rent is dependent on the nature of the small-numbers exchange situation. The larger the price interval within which there are no equally profitable alternative trading opportunities to a supplier and a user, the larger will the appropriable part of the joint quasi-rent be.

Small-numbers exchange emerges in the case of asset specificity. In a standardized type of business such as the pulp and paper industry, the type of asset specificity to consider is primarily site specificity.<2> Site specificity can, besides technological interdependency, be due to the fact that transportation costs are lower in purchases from nearby suppliers and sales to nearby customers. In the case of technological interdependency, there are also often other transaction specific advantages such as thermal economies and savings in inventory and handling costs (cf. Section 6.5).

In all these cases market power is involved. If there is only one seller and one buyer on a nearby market, we have a bilateral monopoly. Market power can also, depending on market shares and cooperation, be exerted when there are many sellers and buyers in the market. <3> If both buyers and sellers cooperate perfectly in cartels the limiting case of a bilateral monopoly is obtained. Also, the higher the market share for a firm or a cooperating group of firms, the more market power can be exerted.

High transaction costs arise when small-number exchange is paired with uncertainty. Uncertainty makes opportunistic and strategic behaviour viable. Long-term contracts are apt to be either incomplete and informal with high enforcement costs or lengthy and complex with high negotiation costs and costs of reduced flexibility. In the pulp and paper industry it is principally the sensitivities of input supply and output demand to business cycle fluctuations that give rise to a situation of uncertainty.

In addition to the factors hitherto considered that determine the costs of transactions between independent firms (external transaction costs), the impact of transaction costs within a firm (internal transaction costs) has to be accounted for. As noted in Section 2.5, it is first when external transaction costs exceed the costs of organizing an additional transaction within the firm that vertical integration represents the most efficient institutional mode. The magnitude of internal transaction costs is dependent on the degree of similarity in managerial know-how between adjacent stages. If there are affinities in production techniques and marketing skills the coordinating capacity of management will be less of a constraint on vertical growth through merger or internal expansion. Similarity in know-how is therefore also a factor that has to be considered in the empirical analysis.

There are thus three factors to which special attention will be paid in the empirical analysis, viz. (1) small-numbers exchange caused by asset specificity, (2) uncertainty caused by variability in input supply and output demand, and (3) similarity in know-how between adjacent stages indicating low internal transaction costs. The type of asset specificity that is of particular relevance to this study is site specificity in the form of (a) technological interdependency and

(b) market power on nearby markets. In table 4.1 the ranks of the factors and the degree of vertical integration are shown for the different transactional interfaces in the production chain of pulp and paper.

In all cases where technical integration is common and most cases where the market power on nearby markets is characterized as either high or medium, the degree of vertical integration is also high. An exception to this pattern is the backward integration from pulp into wood fibre. Despite the high degree of small-numbers exchange and uncertainty and similarity in know-how, about 50 per cent of the wood used in Swedish wood pulp production is bought from independent suppliers (primarily private forest owners). This, considering the transaction situation, comparatively low degree of vertical integration can be explained by the fact that the Swedish Land Acquisition Acts have since 1906 acted as a barrier towards backwards integration with wood fibre production.

Low degree of uncertainty (i.e. stable demand) and dissimilarity in know-how coincides with a lack of forward integration into paper conversion for folding boxboard, newsprint and magazine paper, and fine paper. The dissimilarity in know-how and the low demand variability for newsprint promote exchange by long-term contracts despite the fact that there is some market power on nearby markets.

For fine paper it is to be observed that forward integration is common with wholesaling instead of with conversion. An explanation is that the demand for know-how is more similar in the wholesaling than in the conversion stage (which includes publishing activities).

Table 4.1 A Ranking of Factors Determining Vertical Integration within the Swedish Pulp and Paper Industry. A Summary.

	Factors promoting vertical integration:					
Integration between	Small-numbers exchange: a) power on nearby markets (1)	b) technical integration (%) (2)	Uncertainty (3)	Similarity in know-how (4)	Vertical integration (%) (5)	
1 PULP AND WOOD	High	0	High	High	50	1)
2 PULP AND PAPER						
-mechanical pulp	---	80	High	High	80	2)
-semi-chemical pulp	---	100	High	High	100	2)
-unbleached chemical pulp	---	80	High	High	84	2)
-bleached chemical pulp	Medium	20	High	High	28	2)
3 PAPER AND PAPER CONVERSION						
-kraftliner	Medium	0	High	High	30-35	
-semi-chemical fluting	Medium	0	High	High	10-20	
-sackcraft	Medium	0	High	High	35-45	
-folding boxboard	Low to medium	4) 0	Low	Medium	0	
-newsprint and magazine paper	Medium	0	Low	Low	0	
-fine paper	Low to medium	5) 0	Medium	Low	0	6)
-tissue paper	Medium	>75	Low	High	80-95	

1) Integration of big private forest companies according to Table 5.3.

2) According to FAO Pulp and Paper Capacities 1983 p 89. Note: Foreign integration is not included. For bleached chemical pulp the integration figure would exceed 30 per cent if integration with papermills abroad is included.

3) Source: SCPF Energiförbrukningen i Massa- och pappersindustrin 1979.

4) Medium for, e.g., liquid packaging board and lower for most other qualities.

5) Medium for standardized qualities.

6) Vertical integration with wholesaling instead of paper conversion.

COMMENT: The values "Low", "Medium" and "High" correspond to qualitative judgements of the author that are explained in subsequent chapters.<4>

The empirical examination also shows that a large number of market contracts (contracts for interfirm transactions) exists. These contracts are summarized in Table 4.2. The long-term contracts are most common for relatively standardized products such as wood, pulp, liner, fluting and newsprint. These are products for which a small-numbers exchange situation prevails on nearby markets (compare Table 4.1). As noted in Section 2.3.4, short-term contracts are likely to represent a less efficient transaction mode in such an exchange situation.

The incomplete type of long-term contract, the reservation contract, is in accordance with the theory advanced in Section 2.3.4 common in nearby transactions of pulp, liner and fluting. These are transactions characterized by small-numbers exchange and uncertainty about market conditions. This is to be contrasted with the nearby newsprint trade. Due to a more stable demand a more complete type of long-term contract specifying prices, delivery dates as well as quantities and qualities can be used in newsprint transactions.

Short-term contracts are used in sales of pulp, liner, fluting and newsprint on overseas markets, where there are no site specific quasi-rents. In addition, for those qualities of fine paper and folding boxboard, where the Swedish producers are small relative the size of the West European market, short-term contracts are the common transaction mode. For a grade such as sackcraft that is characterized by small-numbers exchange in nearby transactions, the use of short-term contracts can be explained by the relatively low degree of standardization (sackcraft is produced according to differing customer specifications, see Section 7.3). As both price and quantity of a certain specification demanded by a customer vary, long-term agreements are apt to give rise to high enforcement costs or costs of reduced flexibility.

In the following Chapters, 5 to 8, the choice of transaction modes in the Swedish pulp and paper industry is studied in more detail. Organizations of wood transactions are analyzed in Chapter 5, pulp transactions in Chapter 6 and paper transactions in Chapters 7 and 8.

Table 4.2 A Summary of the Most Common Market Contracts for Wood, Pulp and Paper.

Transac- tions (1)	Name of contract (2)	Length of contract (3)	Degree of "openness" (4)	Use (5)
WOOD	Delivery contracts	Spot transac- tions or long- term	Specified in terms of quantity, qual- ity, price and de- livery	Common in tran- sactions with forest owners' associations
	Stumpage sales contracts	Usually 3-5 years	The right to use standing timber is transferred (i.e. deliveries not specified)	Common in tran- sactions with individual for- est owners
PULP	Short-term contracts	Spot transac- tions	Specified in terms of quantity, qual- ity, price and de- livery	Common in trade on "overseas" (non-European) markets
	(Long-term:) Reserva- tion con- tracts	Usually 1 year	Specified only in terms of quantity and quality. Price and often also de- livery dates are subject to quarter- ly negotiations.	Common in trade on "nearby" (West-European) markets
PAPER	Short-term contracts	Spot transac- tions	Specified in terms of quantity, qual- ity, price and de- livery	With the exception of nearby trade of standardized grades such as liner, fluting and newsprint, this is the com- mon contract form in paper transac- tions
	(Long-term:) (a) Reserva- tion con- tracts	Usually 1 year	Specified only in terms of quantity and quality. Price and often also de- livery dates are subject to quarter- ly negotiations	Common in liner and fluting trade on "nearby" (West-European) markets
	(b) More com- plete type of long- term con- tracts	Usually 1 year	Specified in terms of quantity, qual- ity, <u>price</u> and delivery	Common in news- print trade on "nearby" (West-European) markets

Notes

1. See Vlachos (1985, pp. 31-45).
2. To a certain extent human asset specificity is also present as transactional advantages in the form of mutual trust (of, e.g., prompt deliveries and payments) and communication economies (as, e.g., idiosyncratic language) are developed in longstanding relations in the pulp and paper markets (see Williamson, 1979 and Kinch, 1974).
3. See, e.g., Needham (1978, Ch. 2) and Shepherd (1979, Ch. 15).
4. Liner/fluting can serve as an illustrative example. About 30 per cent of the EEC kraftliner consumption is imported from the two largest Swedish producers. The market shares of the leading Swedish producers of semi-chemical fluting are also high. However, with broader definitions of the markets, that include substitute materials such as waste-based liner and fluting, the Swedish shares fall substantially, especially for fluting. The value "medium" for nearby market power is explained by strong competition from substitute waste-based materials. The standardized character and the small part of the paper supplies that are made to unintegrated converters justify the value "high" for demand variability in market exchanges (uncertainty). The comparatively low requirement of graphic knowledge in the conversion stage is a reason why the similarity in know-how between the stages has been characterized as "high".

The geographical size of what is considered as nearby markets is dependent on transportation costs. While it is primarily the domestic market that is judged as nearby for roundwood, most of the West European market is characterized as nearby for pulp and paper.

5 INTEGRATION BETWEEN FORESTRY AND PULP PRODUCTION

5.1 Introduction

The purpose of this chapter is to analyze the incentives for integration between forestry and pulp production. <1> Section 5.2 gives the historical background. Changes in property rights and the ownership of forests from the beginning of the 19th century up to the present and the development of forest owners' associations are described. In Section 5.3 present Swedish wood transactions are presented with respect to market organization, vertical integration, contracts and supply conditions. Small-numbers exchange on the Swedish pulpwood market is studied in Section 5.4. The choice of proper transactional arrangements in response to a small-numbers exchange situation, such as long-term cutting rights and vertical integration, is severely circumscribed by the law. The effects of these transactional restrictions are discussed in Section 5.5. In Section 5.6 it is demonstrated how the analyses in earlier works concerning the Swedish wood market are developed by the transactional approach. Section 5.7 summarizes the chapter.

5.2 A Historical Review

5.2.1 Private Companies - Property Rights and Backward Integration <2>

At the beginning of the 19th century the iron works were the largest industrial users of wood. The wood was used in the production of charcoal and sawn timber for the foundries and the iron mines. The iron works owned large forest areas. The largest forest owner was Uddeholm, which owned about 100,000 ha of woodland in 1835. Another large owner of woodland was Hellefors (30,000 ha). Both these iron companies were situated in the Province of Värmland. After the expansion of the sawmill industry in the middle of the century and the introduction of steel processes requiring less charcoal, the iron works' forests became to an increasing extent used as a raw material source for the sawmill industry.

The sawmill companies did not own anything like as large forest areas as the iron works. As an example, Norrland's oldest wood processing company, Wifstavarf, in 1827 owned 300 ha of forest and not more than 5,000 ha of forest land by 1850.

Besides their own forests the iron works secured the supply of wood from cutting rights in "recognition-forests" (rekognitionsskogar).^{<3>}

For these cutting rights the companies paid a "recognition-fee" (rekognitionsavgift).^{<4>} In 1811 the iron works were offered the opportunity to acquire the "recognition-forests" from the state. Initially there was little interest in obtaining ownership rights to these forests. Business was low in the iron industry and the tax on ownership of forest land was higher than the "recognition-fee". At first the offer to buy the forests was restricted to a period of six years. In 1824 the period was extended to 1899. By the middle of the 19th century the iron companies began to diversify into the sawmill industry and the interest in acquiring their own forests rose. Before 1898 330,000 ha of former "recognition-forests" were bought.

Sawmills. Certain sawmills, especially in Norrland, had cutting rights in older times in some of the state forests (stockfångstskogar). For these cutting rights they paid a fee per stump (stubböresavgift). This fee was later on changed to a forest rent paid in relation to the area of the forest being used. In contrast to the "recognition-forests", the sawmill companies were not offered the right to buy these forests. At the beginning of the 20th century the cutting rights were not prolonged and gradually ceased.

Company purchases of private woodland from farmers began in the middle of the 19th century when the sawmill industry started booming. These purchases were predominantly made in Norrland. There were several reasons for the rapid growth of the sawmill industry. The following should be mentioned. (1) The Corporation Law of 1848, which offered limited liability of company debts and easily transferable ownership rights (shares), increased the possibility of financing the expansion of the sawmill industry and the acquisition of forest land. (2) The developing industrialization in the western hemisphere increased the demand for sawn wood for construction purposes. (3) The tariff barriers for imported sawn timber in England were successively

removed during 1821-1866. (4) Last but not least, the steam-driven saw was introduced in 1849.<5>

Earlier the saw-machines had been water powered. With the introduction of the steam-driven saw, it was possible to move the sawmills from waterfalls to the coast at the mouth of a river. With such a location the sawmill obtained good shipping possibilities and had the whole forest area along a river as its raw material base. Rivers suitable for the floating of timber could be found in Norrland, Dalarna and Värmland.

At the beginning of the expansion of the sawmill industry, (1850-75), acquisitions of forest land by wood-processing companies were small compared to the growth in demand for sawn timber. Most of the wood was obtained from direct purchases from the farmers and purchase of cutting rights on private woodland. These cutting rights could run for as long as 50 years. During that period a company had the full right to decide when and what trees to be logged provided that the trees exceeded a certain minimum dimension (i.e. a usufruct). These cutting rights can therefore be considered to be very close to full ownership with regard to the disposability of the forest.

It was not until the end of the 1890s that the sawmill companies started to acquire forest land on a larger scale.<6> The reasons for the change in ownership policy were several. First, capital intensity had been increased through large investments in buildings, ports and floating channels. The increased fixed costs made it desirable to obtain an assured supply of raw material in order to avoid small-numbers exchange problems in the division of quasi-rents.

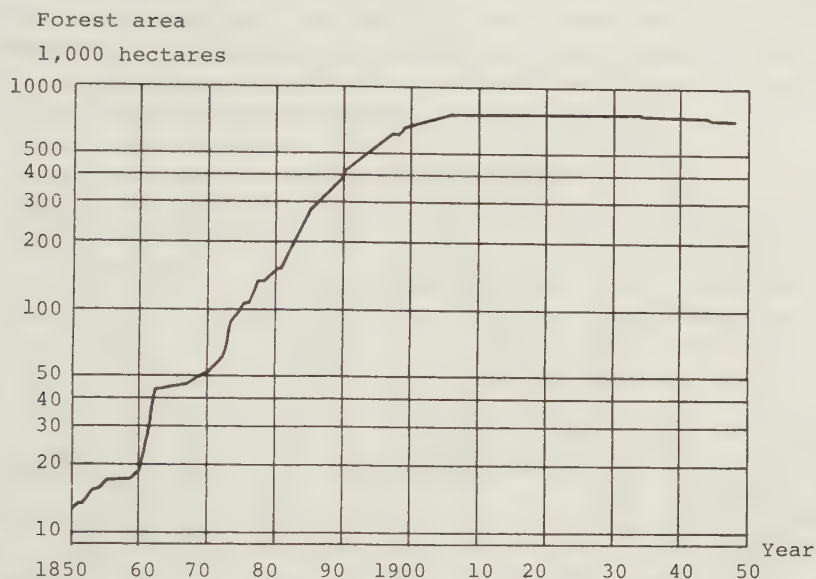
The investments in floatways were of a transaction-specific nature that increased the stumpage value of the forests in the vicinity of the water courses.<7> The sawmills would not have made these investments without, at the least, long-term supply contracts that prevented the forest owners from appropriating the resulting quasi-rents (cf. Section 5.4.1).

Second, there was growing political opinion against cutting contracts covering a long time span.<8> In 1889 the maximum time period in a cutting rights contract was reduced to 20 years and in 1905 to 5 years.<9> The decreasing time periods of cutting rights disfavoured this contract form compared to ownership as a means of securing the supply of wood.

The reduced time spans of cutting contracts were only the start of a more restrictive public policy against industry ownership of forests. The large acquisitions of forest land during the second part of the 19th century had been facilitated by a prevalent liberal ideology that favoured trade in ownership rights. At the end of the century public opinion changed. Company acquisitions of land were resented as the basis for the subsistence of a farming population in Norrland was diminished. Land should to the largest possible extent be used for agricultural purposes. Company acquisitions meant an increased foreign influence in the use of Swedish land property and emigration was taking place because of a lack of arable land, it was argued.

After an intensive debate in the press and in the Swedish parliament (riksdagen) the prohibitionists won. In 1906 a law was issued that prevented companies in the North of Sweden from acquiring private forests needed for farmers' subsistence. The law was valid in the four most northerly counties and in Hälsingland and Kopparberg. The law had an immediate effect. Almost no farming land was, e.g., acquired in the Province of Medelpad by forest companies in 1907 (see Figure 5.1). The part of Sweden encompassed by the prohibition law was successively enlarged up to 1925. In 1925 company purchases of subsistence forests were prohibited in all Swedish counties. It was, however, still possible for forest companies to acquire forests from other companies.

Figure 5.1 Company Ownership of Forests in Medelpad, 1850-1950.



Source: Arpi (1959, p.82) and Hjulström, Arpi and Lövgren (1955).

In 1937 a barter principle was introduced in the prohibition law. A company had the right to acquire land of a value equal to the value of land sold during the last ten years. Since 1947 the state has the right to first refusal in all sales of farm forests.

A temporary release in the prohibition against a company acquiring private woodland was made in the Land Acquisition Act of 1964. According to this law a company was free to acquire private woodland provided that the land in question was not needed for improvement in the size and structure of nearby private woods.<10>

The possibility of companies acquiring private woodland has, however, as a result of change in political opinion, again been restricted in the new Land Acquisition Act of 1979. The sales and purchases of private woodland undertaken by a private company must balance each other in terms of value.<11> The new law is in this respect similar to the law of 1925.

Pulp industry. The expansion of the Swedish sawmill industry was followed in the 19th century by a rapid growth of the pulp industry. Most of the pulp and paper companies that now show the highest degree of backward integration (see Table 5.1) were initially producers of sawn wood.

Table 5.1 Backward Integration with Wood Fibre, 1981 (%).

More than 30 percent:		Between 10 to 20 percent:		Less than 10 percent:
Company	Inte- gra- tion	Company	Inte- gra- tion	Company
Svenska Cellu- losa AB (SCA)	64	AB Papyrus	15	Fiskeby AB
Korsnäs-Marma AB	55	Holmens Bruk AB	11	Södra Skogsägar- na AB
AB Iggesunds Bruk	45			Nymölla AB
Stora Kopparbergs	39			Munksjö AB
Bergslags AB (Stora)				Norrlands Skogs- ägare AB (Ncb)
Billerud AB	36			Munkedals AB
Mo och Domsjö AB (MoDo)	30			

Source: Annual Reports

Note: Backward integration calculated as share of wood consumption supplied from own forests.

The pulp industry was introduced earlier in central than in northern Sweden.<12> Most iron works were situated in central Sweden. In some companies such as Stora Kopparberg and Uddeholm both steel and sawn wood were produced. The wastes from the sawmill production and trees of smaller dimensions were used in the production of charcoal for the iron mills. When the use of charcoal in steel production started to decrease at the end of the 1880s, interest turned to pulp mills as users of this raw material.<13> An important reason for, e.g., Stora Kopparberg to erect a sulphate mill at Skutskär in 1894 was to create a new outlet for the waste from the large nearby sawmill.<14>

In the north, Norrland, the forest companies became interested in investments in the pulp industry when the sawmill industry started to stagnate at the turn of the century.<15> The waste from the sawmills was used as local fuel or for production of charcoal when not thrown away. By investments in the pulp industry the value of the sawmill waste and trees of smaller dimensions was increased.

5.2.2 State Ownership of Forests and Forest-Based Industries<16>

Before 1824 the state had "crown" parks for hunting purposes and claimed ownership to all public land. In 1824 the Parliament, (the Riksdag), decided that land should become private property to as large an extent as possible.

Crown parks were to be sold to, and public land to be divided between, private interests such as farmers and villages. So called "recognition"- forests were offered for sale to the iron and steel companies. Land in northern Sweden was however kept by the state for colonization purposes. The decision to privatize land was based on the belief that private property rights guaranteed a more efficient use of land.

The transfer of land to private owners went slowly. When the decision of 1824 was reversed in 1859, considerable areas of public forests and crown parks were left. In 1859 the Riksdag decided that all forests that remained undivided and unsold would be considered state property. An exception was the "recognition"-forests for which the iron works had an extended time period for purchase up to 1898. In 1859 it was also decided that a special civil service department, the National Board of Forestry (Skogsstyrelsen) (later the State Forest Service (Domänverket)) was established. The motivation behind this reversed view on private ownership was dissatisfaction with the afforestation efforts of the private forest owners. It was claimed that the state had more of a long-term view on the use of forests.

Most of the state forests were by 1859 situated in the far north of Sweden. According to the decision of 1824, the land in the north was to be used for colonization purposes. Before 1856 forests not useful for colonization purposes became crown parks in Norrland. After 1865

the reverse pattern was followed. Only land not useful for the establishment of crown parks was made available for colonization.

By 1875 the state began to purchase forest land. The purchases were to be financed by sales of land, predominantly agricultural land. With some of the acquisitions of forests from iron works were included small sawmills, which were continued in operation by the State Forest Service. These sawmills were just a side effect of the acquisition of forest land. At the beginning of this century, however, the State Forest Service started to discuss the need both to create a demand for pulpwood and to increase the demand for sawlogs in Norrbotten County in the far north of Sweden.

In 1932 the State Forest Service acquired two larger sawmills in Norrbotten (at Lövholmen and Seskary). These acquisitions were followed by others. In 1937 Karsborgsverken was acquired with a new sawmill and sulphate pulp mill. The state now also became a pulp producer. In 1948 two wallboard mills were built at Lövholmen and Skinnskateberg (Örebro County). In 1962 Lövholmen's liner mill was built and in 1974 Örebro Pappersbruk was acquired with its technically integrated pulp and paper production.

By 1942 the wood processing part of the State Forest Service was considered to be large enough for the establishment of a subsidiary, AB Statens Skogsindustrier (ASSI). In 1957 the forest industry sector was separated from the State Forest Service: ASSI became a separate state-owned company.<17> In 1957 the state deliveries of wood to ASSI amounted to 20 per cent of the State Forest service's annual cuttings. By 1977 this share had increased to 40 per cent. By the beginning of the 1970s the portion was about 30 per cent (26 per cent in 1970).<18> The sharp increase during the 1970s was partly the result of a more "active" industry-policy.

5.2.3 The Development of Forest Owners' Associations

Due to transportation reasons the private forest owners along a river had only a small number of mills at the mouth of the river as prospective buyers. Around 1920 the buyers had founded purchasing organizations.<19> Among the buyers of pulpwood almost 100 per cent of

the companies coordinated their purchasing activities through these organizations. The resulting monopsony power could be used to increase company profits through a lower price level on wood (cf. the discussion in Section 3.2.1 in the last chapter).

The private forest owners started to organize themselves in the mid-1920s when the first permanent forest owners' associations (f.o.a.s) were founded.<20> In 1932 a national organization, the National Federation of Swedish Forest Owners (Sveriges Skogsägarföreningars Riksförbund), was founded by eleven out of a total of fourteen associations. At first the f.o.a.s concentrated their efforts on giving information about silviculture. The work was soon extended to negotiations about prices and terms of delivery.

The development of the f.o.a.s was thus a way to establish a countervailing power on the sellers' side of the market. Before organizing, the bargaining strength of the private forest owner was small.

At the outset the f.o.a.s had some difficulties in being accepted as sellers of wood. Efforts were then made to raise the price level of roundwood by making offers to non-traditional buyers and arranging for the export of roundwood.<21>

The private forest owner often played the role of marginal supplier to the forest industry.<22> The forest companies used in the first place wood from their own forests in the mills. Roundwood from private forests was bought foremost during booms.

Special problems arose during those years when storm-felling of timber occurred. The wood had to be taken out of the forests immediately because of the risk of infestation. The large increase in supply during such years resulted in very low prices for roundwood (i.e. the problem of a low price elasticity of wood demand). The large storm felling in 1943 became a signal to the f.o.a.s to purchase and build sawmills.<23> With their own sawmills it would be possible to take care of some of the increased supply caused by storm-fellings. An employed mill manager could be induced to order more saw timber than otherwise. The price level would thereby be less affected.

Later the f.o.a.s started to integrate forward in order to escape the inefficiencies of a bilateral monopoly position and achieve a more stable and secure demand for their wood.<22>

The f.o.a.s in the south of Sweden claimed as early as the 1930s that there was a surplus of sulphate pulpwood in the area in the respect that the annual growth volume exceeded the annual demand of the local pulp industry. In 1952 a Government Commission verified that there was enough wood in the south for a considerable increase in the capacity of the wood-processing industry.<25> The f.o.a.s decided then to increase demand by investing in own pulp mills. In 1959 the sulphate pulp mill at Mönsterås was completed. The Mönsterås mill was followed by a pulp mill at Mörrum in 1962 and a pulp mill at Värö in 1972. At the present time the South Swedish Forest Owners' Association (Södra Skogsägarna) is owner of the largest market pulp capacity in Sweden (about 900 thousand tonnes/yr).

While the associations in the south chose to integrate forwards by investment in new capacity, the associations in the north chose to buy up old mills.<26> Wood-processing capacity in the north was already large enough compared to the forest resources.

During the 1970s there has been a trend towards centralization both on the sellers' and the buyers' sides of the roundwood market. Mellanskog and Vänerskog were founded in 1970 by mergers between 3 and 5 f.o.a.s, respectively, and Mälarskog in 1975 by a merger between 3 f.o.a.s.<27> Industriskog, which is a wood purchasing organization for the forest companies Iggesund, Stora Kopparberg, Korsnäs-Marma and Kopparfors (a subsidiary to Papyrus), was established in 1976. Sydved, which is a purchasing organization for the Papyrus Group and MoDo in the south, was founded in 1979.

5.3 Swedish Wood Transactions - Today

5.3.1 Organization - Vertical Integration and Market

The organization of Swedish wood transactions shows a varied pattern. Roundwood is supplied from private, company and public (i.e. state, church, university and municipality owned) forests. In the second vertical stage, i.e. the pulp, board and sawmill industry, four different categories of wood users can be distinguished. These are (1) the big private companies with more or less forest land of their own, (2) the state-owned company ASSI, (3) forest companies owned by f.o.a.s and (4) the independent purchasing sawmills (köpsåqverken). <28>

Examples of both backward and forward integration can be found. The big private forest companies produce pulp and paper and, in most cases also, sawn wood. These companies are in general more or less backward integrated with their own forests (see Table 5.1). With regard to forward integration, it can first be noticed that the state-owned forestry company, Swedish Forest Service (Domänverket), has sawmills of its own. There is also a separate state-owned wood-processing company, ASSI, with pulp, paper, board and sawn wood in its production scheme.

Secondly, the wood-processing industries owned by the f.o.a.s can be regarded as an example of forward integration, where the control over the first vertical stage, forestry, is not centralized to a single management as would be the case in a vertically integrated corporation. The forward integration consists instead of an identity between the suppliers of wood, the private forest owners, and the suppliers of risk-capital to the wood-processing companies (cf. Section 5.5.2).

In the north, the f.o.a.s have, besides some sawmills of their own, a common ownership interest in the wood-processing company Ncb (Norrlands Skogsägares Cellulosa AB). <29> In the south, Mälarskog and Södra Skogsägarna have their own wood-processing industries. Ncb and Södra Skogsägarna are in addition to sawn wood also large producers of pulp and paper, while Mälarskog only produces sawn wood.

The state and the big private forest companies own most of the forests in northern Sweden, while private forest owners dominate as a group in the south (see Table 5.2). <30> For Sweden as a whole private forests, public forests and company forests occupy 50, 25 and 25 per cent respectively of the total forest area. Considering instead the volume of wood, the proportions are 57, 19 and 24 per cent.<31> The reason is that the private forests are situated on land belonging to a higher site class. More than 50 per cent of the private forest area belonged in 1982 to private wood-lot owners affiliated to forest owners' associations.<32>

Table 5.2 Percentage of the Swedish Forest Area held by Different Ownership Categories.

Regions	Public owners	The big private forest companies	Private wood-lot owners	Total
North Norrland	46	16	38	100
South Norrland	12	47	41	100
Svealand	17	31	52	100
Götaland	14	8	78	100
The whole country	25	25	50	100

Source: Skogsstatistisk årsbok 1977, p. 51.

About 50 per cent of the annual consumption of roundwood in Sweden is bought on the market.<33> The big private forest companies are self-sufficient to about 50 per cent of their demand for wood fibre. The independent sawmills are dependent on the market for almost all of their demand for saw timber. ASSI, the state-owned company, obtains most of its wood (two thirds) from the Swedish Forest Service (Domänverket), which administers all state-owned forests. ASSI has therefore to buy about 1 million m³ f ub (cubic metre solid volume under bark) on the market (see Table 5.3)

Table 5.3 The Roundwood Market, 1979 (million m³ f ub).

Category	Demand	Supply	Net purchase(-) Net sale (+)
Big private forest companies	29	15	-14
The state (ASSI and Domänverket)	3	6	+ 3
Other public forest owners	-	3	+ 3
Private forest owners within f.o.a.s	9	19	+10
Private forest owners outside f.o.a.s	-	14	+14
Independent purchasing sawmills (oberoende köpsågverk)	13	-	-13
Others	3	-	- 3
Total	57	57	0

Source: SOU 81:81, p. 97

Note: 85 per cent capacity utilization in the the forest industry is assumed.

The net suppliers of wood are consequently the private forest owners and the public forests, where the private forest owners account for about 80 per cent of the net supply. The prices of roundwood are subject to annual bilateral negotiations between the f.o.a.s, who act as representatives for the private forest owners, and the wood purchasing and sawmill organizations, who act as representatives for the buyers. These price negotiations take place within different price regions and separate price agreements are concluded for each of these regions. The price regions differ for the pulpwood and saw timber markets and have also been changing over time (see Table 5.4 for the pulpwood market situation in 1982).

Table 5.4 Pulpwood - Price Regions and Contract Parties, 1982.

Price regions (provinces and counties)	Seller (f.o.a.s)	Buyer
Norrland down to Ljungan in the south (price region 1)	Norrbottens Västerbottens Örnsköldsviks Norrskog	Nordsveriges virkesköpare
Hälsingland, Härjedalen, Dalarna and Gästrikland (price regions 2 and 3)	Mellanskog	Industriskog
Uppland, Västmanland and Södermanland	Mälarskog	Industriskog, Holmens Bruk, Fiskeby and ASSI
Värmland, Örebro County, Skaraborg County, Bohuslän and Dalsland	Värmlands Örebro Västra Skaraborgs	Sydved, Billerud, Holmens Bruk, Fiskeby and ASSI
The rest of Sweden except Skåne	Södra Skogs- ägarna	Sydsvenska virkes- föreningen
Skåne	Skåneskog	Sydsvenska virkes- föreningen

Source: Direktör Carl Gustaf Sundberg, Skogsindustriernas samarbetsutskott.

In 1982 there were 6 and 10 price regions respectively for pulpwood and saw timber. In price regions 1, 2 and 3 the price negotiations for pulpwood and saw timber are coordinated. It has to be pointed out that the negotiations are about the stipulations in one of the different contracts used on the roundwood market, the delivery contracts (leveransvirkeskontrakt). The price determined is the price that will be effective for all wood delivered by f.o.a.s. In practice this price will also serve as a minimum price for all other wood transactions on the roundwood market.

Besides roundwood, the pulpmills use sawmill waste as raw material (predominantly wood-chips (sågverksflis)). In 1980 about 25 per cent of the total fibre consumption in the Swedish pulp industry consisted of sawmill waste. <34> An increasing part of the total deliveries of roundwood to the pulp industry consists of imported wood (cf. Table 5.6 for pine pulpwood). In 1980 the net import of pulpwood amounted to

about 6 per cent of total deliveries to the pulp industry.<35>

The prices of sawmill-waste are negotiated annually between the central organizations in the sawmill and pulp industry. In the south the prices are determined in negotiations between Sågverkens Biprodukter (SABI) and Southern Swedish Pulpwood Association (Sydsvenska Virkesföreningen), ASSI and Södra Skogsägarna on the buyers' side. In other parts of Sweden, different regional organizations AB Sågverksintressenter represent the selling side. An exception to this pattern is Mellansvenska Samarbetsområdet in central Sweden, where individual sawmills also negotiate with the big pulp and paper companies. A large part of the trade in sawmill waste takes place in the form of barters, where the big pulp and paper companies offer surplus quantities of saw timber in exchange for, e.g., wood chips from the sawmills.

5.3.2 Contracts

The different types of contracts used in the Swedish roundwood market are delivery contracts (leveransvirkeskontrakt), stumpage sales contracts (rotpostkontrakt), delivery stumpage contracts (leveransrotpostkontrakt) and different kinds of logging contracts.<36>

Delivery contracts. Delivery contracts are the most common contract type in the Swedish roundwood market. All roundwood supplied by the f.o.a.s and a large part of the roundwood supplied by other agents in the market is sold according to a delivery contract. The prices in delivery contracts are annually negotiated between f.o.a.s and wood purchasing organizations.<37> Besides playing a part in the price negotiations, the f.o.a.s handle logistic and contact activities such as arranging the sale of wood and its assembly and transport from their members to the industry. The f.o.a.s also offer assistance with or actually undertake the logging of a woodlot. Wood sold under a delivery contract is to be delivered at a given place, at a given time and processed in a given form. By contrast with the stumpage contract, the delivery contract can be considered as a specified contract (cf. Table 4.2).

A delivery contract can be of a short-term or a long-term character. The long-term quantity agreements are concluded with large sellers such as the f.o.a.s. The time period is usually one year, but contracts for more than one year are also concluded. In connection with the drawing up of a contract a time plan for the delivery of the agreed quantity is usually made up. Wood purchases from private forest owners are usually of a short-term character stating the delivery of a quantity of wood at a certain time-point.

Stumpage sales contracts. A stumpage sales contract implies that the buyer buys the right to the use of the trees in a forest for a time-period of 3-5 years (i.e. a usufruct) (5 years is the maximum time-period).^{<38>} All cutting and transportation activities are usually to be arranged by the buyer and the price paid to the forest owner is in this case equivalent to the stumpage value of the standing timber (i.e. the value net of transportation and logging costs). By contrast with delivery contract sales, the wood price in a stumpage contract is always negotiated with each forest owner individually.

Logging Contracts. A third class of contracts used in the roundwood market are different types of logging contracts. Common to all logging contracts is that the wood is measured when logged and delivered to the industry and that logging is not undertaken by the forest owner. In a stumpage contract it is the standing timber that is being measured and in a delivery contract it is the forest owner that is responsible for logging. Both these contracts have their disadvantages.^{<39>} Under a delivery contract it might be difficult for the forest owner to get help with the logging (especially if the forest owner lives off the estate). In a stumpage sale it is difficult to measure and evaluate the quantity of wood that is to be used in the processing industry.

Delivery stumpage contracts. Because of these two difficulties, a special logging contract called delivery stumpage contract (leveransrotpostkontrakt) has become increasingly popular. A delivery stumpage contract is similar to a stumpage contract in time-period (a maximum of 5 years) and the freedom in use of the standing timber. It is however dissimilar with regard to measurement and payment for the wood. In a delivery stumpage contract an individual agreement is made about a certain stumpage value per cubic metre of wood.^{<40>} The

measurement of the wood then takes place as the wood is logged and delivered to the industry.

It is much easier to measure the wood when it arrives at the pulp industry than as standing timber. Both parties to the deal benefit. The seller does not have to log himself and is assured of a certain stumpage value per cubic metre of wood. The buyer does not have to undertake costly and less reliable measurement and evaluation procedures.

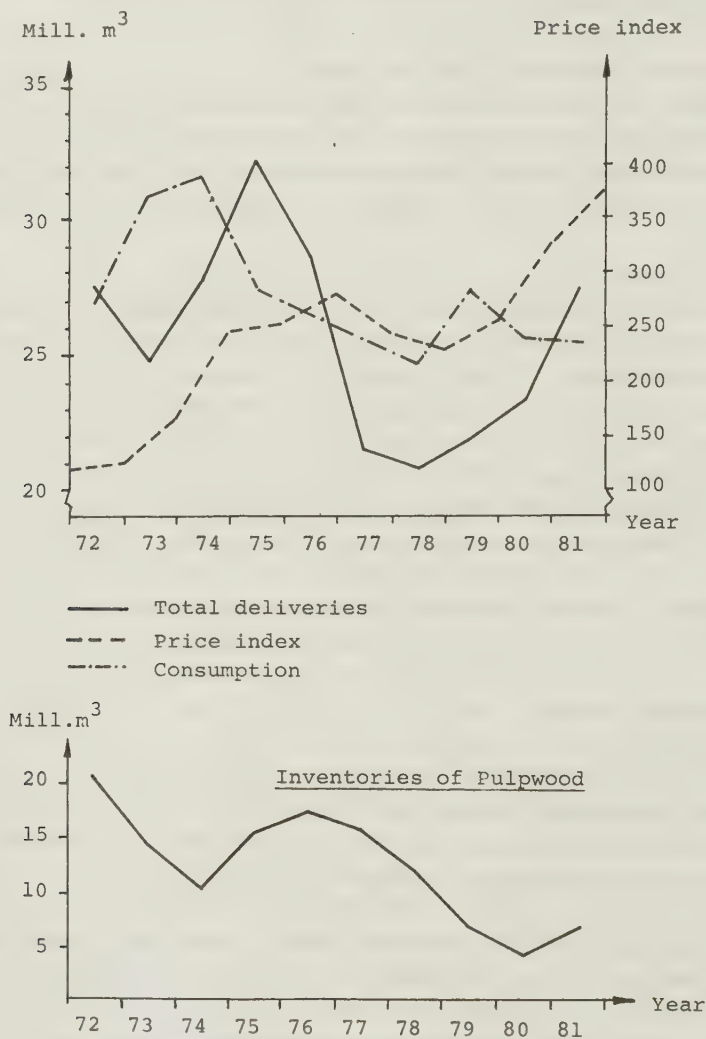
We conclude, thus, that among the different contract forms the delivery contract is most akin to the economist's concept of a market, while a stumpage sale is the contract that comes closest to vertical integration in terms of length of time and disposability. In a delivery contract a specific product, saw timber or pulpwood of certain qualities, lengths and dimensions, is traded. A stumpage contract implies instead that the right to use and appropriate the yield from a woodlot is transferred for a certain time period. Delivery stumpage contracts and other logging contracts lie in this respect somewhere between delivery and stumpage sales.

5.3.3 Supply Conditions

The demand for pulpwood is sensitive to cyclical business fluctuations. With demand uncoordinated, supply changes give rise to large fluctuations in the wood price and can make it impossible for a company to obtain enough wood at the going price.

Figure 5.2 illustrates the demand and supply patterns for pulpwood during the time period 1970 to 1980. During the two booms for the pulp and paper industry in 1973-74 and 1979-1980 the demand for wood indicated by the wood consumption line substantially exceeded the quantity supplied. The difference between the demand and supply patterns in these years are reflected in the bottom figure by sharp decreases in the inventories of pulpwood held at the mills. Notable is the large increase of inventories of around 70 per cent between 1975 and 1977 that changed to an almost complete depletion of inventories in 1980.<41>

Figure 5.2 Total Deliveries, Consumption, Price Index and Inventories of Pulpwood, 1972-1981.



Source: Skogsstatistisk årsbok 1977, pp. 197 and 136, 1980, pp. 160, 121 and 113 and 1981-1983 and Skoglig statistikinformation 1983.

Note: Total deliveries are calculated as consumption plus change in inventories.

The quantity of wood supplied on the domestic market was low compared to demand during these two booms.<42> For the pulpmills with a low self-sufficiency of wood the supply problems were especially severe during the boom 1979-1980. Many of them restricted their production because of a shortage of wood.<43> A survey of the annual reports from forest companies with a self-sufficiency of less than 20 per cent show that most of them had difficulties in getting enough wood to their pulpmills.

In the south the forest companies Nymölla, Papyrus, Munksjö and Södra Skogsägarna and in the north Ncb state that they had to restrict their pulp production because of a lack of wood.<44> Other companies with a low degree of self-sufficiency such as Holmen and Fiskeby claimed that they had difficulties in obtaining enough wood and had to resort to expensive imports.

The increase in marginal wood costs for those companies that had to resort to expensive imports can be illustrated by a comparison of the increases in domestic delivery prices and import prices. The average c.i.f. price for imported pulpwood (pine and spruce) rose from 165 SEK/m³ (SEK per cubic metre) in 1979 to 215 SEK/m³ in 1980.<45> In the same time the average domestic pulpwood price, delivery at motor road, rose from 96 to 107 SEK/m³.<46>

The price system often seems to fail to adjust supply to the cyclical changes in the demand for pulpwood. Figure 5.2 illustrates the pattern for the time period 1970 to 1981.<47> After the beginning of the boom for the pulp and paper industry in 1972/73 the prices for pulpwood continued to increase even when the consumption of pulpwood had started to decrease in 1975. In 1976/77 the price of pulpwood reached its peak: more than twice as high as in 1972/73. The total deliveries to the industry, which reached their peak in 1975, were also larger in 1976 than in 1974 in spite of the fact that the consumption of pulpwood had decreased from 31.6 millions m³ to 26.4 millions m³ between these years. The same pattern was repeated in the subsequent boom that started in 1978/79.

An explanation of these repeated difficulties for quantity supplied to adjust to changes in demand could be that the private forest owners during booms expect further price increases. Expectations of higher future wood prices lower the price elasticity of supply.<48>

The difference between import prices and domestic prices raises the question would it not be possible to increase gross profits (quasi-rents) by replacing imported wood with increased purchases on the domestic market? A forest company contemplating such a purchase policy must take its monopsonistic influence on the average domestic price level into consideration (cf. Sections 5.4.2 and 3.2.1). Imports are usually increased during booms in the pulp and paper industry. As discussed above, it is also during these periods that the price elasticity of supply is decreased because of expectations of increased wood prices. An increase in domestic deliveries can then only be achieved by a substantially higher wood price. By importation it is instead possible to get additional quantities of wood without affecting the domestic price level. For a company that bases a large part of its supplies on purchases of wood on the domestic market, it might therefore be possible to obtain higher gross profits if marginal quantities are imported instead of bought on the domestic market.

5.4 Small-Numbers Exchange

In this section it is demonstrated how high transportation costs relative to product value and bilateral market power give rise to an appropriable quasi-rent of substantial size in domestic pulpwood transactions. The dynamic consequences of this small-numbers exchange situation with respect to the market supply of wood and investment in new pulp capacity are also studied.

5.4.1 The Role of Transportation Costs

Because of the high cost of transporting wood, pulp is most efficiently produced when the pulpmill is located near the forest resource. Rydin (1976) has illustrated this fact by comparing the cost of transporting the same volume of wood fibre from North America to Europe in its unprocessed state and as bleached sulphate pulp. According to Rydin it is about five times more expensive to transport the unprocessed wood.

Other estimations indicate that the cost of shipping chipped wood is at least twice the cost of shipping the same volume of wood as bleached sulphate pulp.<49> Considering the lower value to volume ratio of unprocessed wood these estimates also give an hint of the importance for a pulpmill of being close to wood resources.

Studies also indicate the impact of transportation costs on the mill price of domestic wood. In a report by the Energy Research and Development Commission (Delegationen för energiforskning, Dfe) calculations based on average transportation costs, average transportation distances and delivery prices for the season 1979/80 are presented.<50> These calculations show for coniferous pulpwood (pine) that the cost of transporting wood by truck from woodlot to mill as a percentage of total mill cost was 30 per cent in north, 20 per cent in central and 18 per cent in south Sweden. The average distances were 200 kilometers, 120 kilometers and 100 kilometers.

It is the transportation costs that determine the scope for price negotiations in the small-numbers exchange situations on the wood market. Let us first consider the case of site-specific capital represented by floatways (cf. Section 5.2.1).

When the forest companies started to use floatways for wood transportation, vast forest areas from which horse transportation was too expensive became accessible. The cost of floating timber consisted mainly of fixed costs in the form of investment in and maintenance of stream-beds, dams, bars, channels and sorting facilities.<51> The variable cost of floating a cubic metre of wood was very small.

The difference in variable cost between floating and horse transportation from an alternative woodlot constituted the quasi-rent that forest owners along a floatable river could potentially appropriate from a buyer downstream. Seen in this perspective, the interest of the wood-processing industry in obtaining 50 years cutting rights or complete ownership rights to the forest land along a river before making investments in floatways is easily explained. These two were the only transactional arrangements by which high negotiation and enforcement costs in future small-number exchanges could be avoided.

Nowadays, floating has been replaced by truck transport. Trucking as a form of transportation means does not represent the same small-numbers exchange problem since the proportion of variable cost to fixed cost of road investment and maintenance is much higher. Differences in transportation costs are more related to distance.

As the prices in all delivery contracts since season 1978/79 are quoted delivered at motor road (delivered at motor road E4 in the far north), the mill price for wood (i.e. delivery price plus transportation costs) is lowest for woodlots in the vicinity of a mill. This difference in mill prices due to location gives rise to a small-numbers exchange situation. By selling the wood according to an individually negotiated stumpage contract instead of the collectively negotiated delivery contract, a nearby woodlot owner can appropriate part of the savings in transportation costs to the mill. Particularly during booms, when the alternative for the mill may be to import wood (see Section 5.4.3), the size of the appropriable quasi-rent can be considerable.

Transportation costs also influence the negotiable price span in bargaining between organized sellers and buyers on the domestic wood market. Prices higher than the mill price for imported wood are not likely to be agreed upon, since these would result in a sharp decrease in orders for domestic suppliers. By the same token, a price lower than that a forest owner can obtain as a net price in exports would result in a sharp drop of domestic supply. A crude estimation of the minimum size of this price span is provided in Table 5.5.

Table 5.5 Net Imports, Average Import Prices (CIF) and Average Export Prices (FOB), Pine Pulpwood, 1970-1983.

	Year	Net im- ports (1000 m ³ f)	Import price (SEK)	Export price (SEK)	Differ- ence (SEK)
reces- sion	1983	1030	249	197	52
	1982	1299	288	211	77
	1981	2810	253	166	87
	1980	1666	218	141	77
boom	1979	1298	171	124	47
	1978	670	149	135	14
	1977	1260	164	144	20
reces- sion	1976	1310	147	139	8
	1975	2067	148	117	31
	1974	434	129	85	44
boom reces- sion	1973	-623	79	64	15
	1972	-565	75	59	16
	1971	-539	77	64	13
	1970	-424	66	58	8

Source: SOS Utrikeshandel

5.4.2 Bilateral Market Power

The organization of private forest owners in f.o.a.s and the collaboration between wood users within the different price regions (see Section 5.3.1) have market power consequences that are reinforced by the way property rights are specified in the forestry industry. The result is a bargaining situation that can be analyzed with the bilateral monopoly approach described in Section 3.2.

The monopsonistic power of the wood buyers is strengthened by barriers to entry and coordination of wood purchases. Barriers to entry are created by paragraph 136a in the Building Act. This paragraph states that the government is to give permission to all new investments in wood processing industries with the exception of sawmills with a capacity of less than 5000 m³ of sawn wood per year.<52> The criterion for getting permission for a capacity-enlarging investment is that it must be shown that there will be no serious rivalry in the demand for wood within the surrounding forest area.<53>

In order to exert market power it is important for the pulp producing companies to coordinate their purchasing activities. A price level lower than P_0 in Figure 3.1 is more easily sustained if all companies cooperate in achieving the necessary restrictions in quantity demanded. This cooperation is facilitated in the Swedish pulpwood market by the small number of buyers within each price region.

The ability of the companies to act in concert can be improved by the establishment of a common intermediary for wood purchases. Through centralization of purchasing activities demand restrictions can be more effectively enforced. Examples of such intermediary organizations on the Swedish market are Industriskog AB in central Sweden and Sydved AB in south Sweden (cf. Table 5.4).

The f.o.a.s on the other side of the market perform the functions of both being intermediaries that organize the wood sales of private forest owners and of acting as representatives for the members in the annual price negotiations. Without this dual role of bargaining and sales organization it is doubtful if a f.o.a. could ever establish a price exceeding P_0 in Figure 3.1. The numerous private forest owners would probably force down the price.

As a sales organization the possibility of a f.o.a. sustaining a high price through control of the wood supply is enhanced. Besides pure persuasion of the members to deliver a certain quantity of wood, the control means at its disposal are use of inventories, variations of the processing rate in its own industry, and the right to first refusal.<54>

The market power of f.o.a.s is protected in the Land Acquisition Act by the legal hinderance to company purchase of private woodlots. The opportunity of private forest companies to negate the market power of f.o.a.s by backward integration is thereby severely circumscribed.

In a comparison of market power it is to be observed that the organized private forest owners are more numerous and of smaller size than the pulp and paper companies. For this reason it might be more difficult for private woodlot owners to collude for monopoly profit than it is for the buyers to collude for monopsony profit. Furthermore, the f.o.a.s do not represent all private forest owners

and the public forests also supply wood to the market. In turn the pulp and paper companies have to face some competition from the board and sawmill industries in the demand for roundwood.<55>

In Table 5.8 the percentage of forest area and volume held by integrated forest companies and by private forest owners affiliated to f.o.a.s have been calculated for both the north and the south of Sweden. These percentage figures are of interest in a discussion of market power in different parts of Sweden. The f.o.a.s can be considered to have more market power in the south, where they represent almost 50 per cent of the volume of wood, while in the north their share is only 25 per cent. Furthermore, the buyer is not as dependent on the open market in the north as in the south. The forest companies in the north have their own forests corresponding to 30 per cent of the total wood volume while the figure for forest companies in the south is only 15 per cent.

Table 5.6 Forest Area and Wood Volume held by Different Ownership Categories, 1977 (%).

		Big private forest com- panies	Private wood- lot owners <u>without</u> mem- bership in a f.o.a.	Private wood- lot owners <u>with</u> mem- bership in a f.o.a.
North:	Area	30	40	22
	Volume	30	45	25
South	Area	17	69	45
	Volume	15	72	47

Source: Skogsstatistisk årsbok, 1977, pp. 51, 59 and 78-79.

The small-numbers exchange situation gives rise to a bargaining area. The processing industry's bargaining position is in a short-run perspective negatively affected by the higher values that are at stake. While a private forest owner loses the difference between the opportunity yield on financial capital and the value increase of standing timber, the processing industry loses all its gross profit if no trees are cut.<56> Furthermore, the private forest owners usually

have alternative income sources from farming or other occupations.

The forward integration of the f.o.a.s has improved their knowledge about costs and revenues in the succeeding production stages, whereby the size of the appropriable quasi-rent can be more accurately appreciated.

Ultimately it is, however, the f.o.a.s' control of the wood supply that determines to what extent a probable bargaining advantage can be exploited. The claimed shortage of domestic wood during 1979-1981 could be interpreted as evidence of the inability of the f.o.a.s to establish a price exceeding the equilibrium price P_0 in Figure 3.1. An alternative explanation could be that both the parties in the annual negotiations misjudged the future positions of the MC_S - and MR_B -curves (cf. discussion in Section 5.4.3)

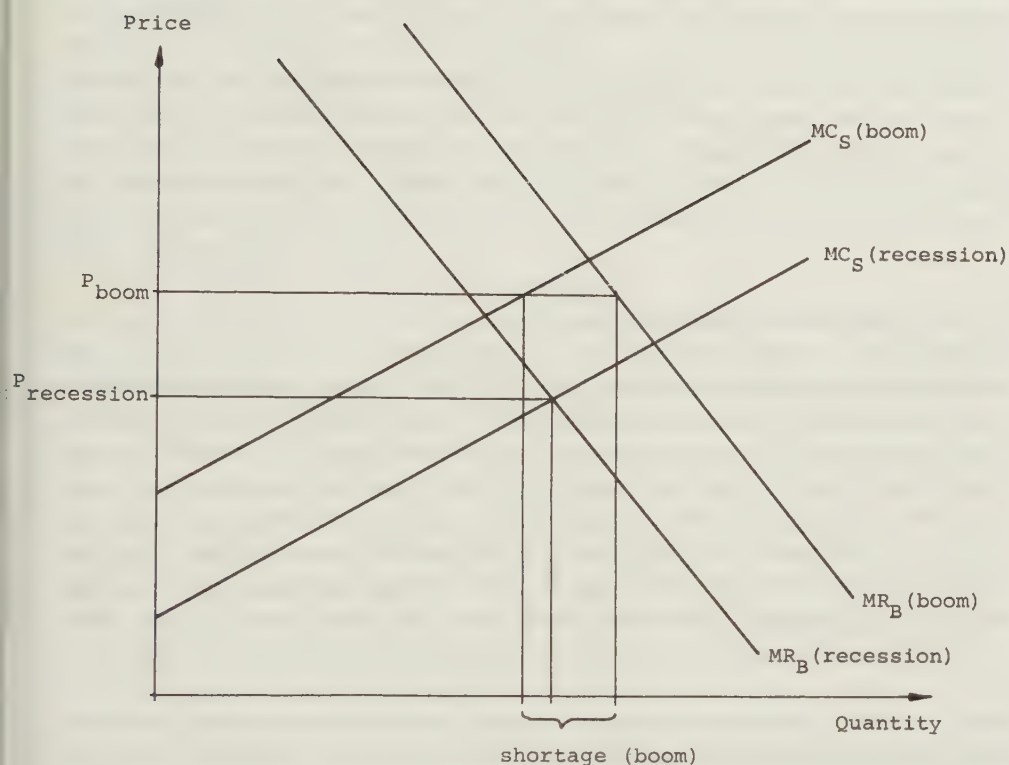
5.4.3 Business Cycle Effects

The position of the demand curve for wood changes over a business cycle. During booms the derived demand increases. In Figure 5.5 this is represented by an outward shift of the MR_B -curve.

As noted in Section 5.3.3, the MC_S -curve determining the short-run supply of wood is also likely to change between the different phases of a business cycle. During a boom the expectation of higher prices in the near future increases the reservation prices of the woodlot owners.<57> The MC_S -curve thereby shifts upwards. The result can be that, in spite of an increase of the domestic price level, the supplied quantity decreases. The price increases necessary to avoid shortages of domestic wood might be considerable (see Figure 5.3).

The shortages of domestic wood during the last boom, 1979-80, can be explained in these terms. The expectation of better future sales terms made the MC_S -curve shift upwards so much that the increase in wood prices could not induce the forest owners to increase their supply.<58>

Figure 5.3 Shifts in MR- and MC-Curves during a Business Cycle.



The lower elasticity of marginal cost curves during booms makes it unprofitable for the buyers to eliminate emerging shortages of domestic wood by raised delivery prices. Importing is likely to be a more profitable strategy, even if the mill price considerably exceeds that paid in a domestic delivery contract.

An alternative to imports and delivery contracts is to buy wood according to a stumpage contract. Stumpage contracts are negotiated individually with the forest owner. Distortions in marginal costs due to monopsonistic power can thereby be avoided. The mill price for imported wood and the mill price in domestic delivery contracts are

likely to set upper and lower limits to the negotiable price in a stumpage sale. Because of the impact of transportation costs this price span is especially large for woodlots in the vicinity of a mill.

Empirical observations show that net imports increase sharply during booms (see the periods 1974-75, 1979-80 and 1983 in Table 5.5). The prices paid for standing timber in stumpage contracts are also especially high compared to delivery contracts in the beginning of booms.<59>

5.4.4 Ex Post and Ex Ante Capital Costs

A distinction has to be made between ex post and ex ante capital costs when analyzing the bargaining situation in a market like the Swedish pulpwood market with a large appropriable quasi-rent. In the short-term, with given physical capital in the form of infrastructure and pulp and paper production facilities, the wood price can, without affecting the position and shape of the demand curve for wood, be set at a level that leaves the pulp producer with virtually no gross profit. In Figure 3.1 there will be no gross profit in the wood processing industry if P is set equal to AR_P .

Pulp and paper production facilities are specialized capital assets with no value in alternative uses. The historical cost for physical capital is thus a sunk cost. A pulp and paper plant will be in production as long as there is a positive gross profit to cover part of the capital costs for the specialized assets.

In a longer time perspective, which involves gross investments such as the building of new plants or expanding the capacity of old plants, capital costs play a more decisive role in determining the position and shape of the demand curve. The investment decision is dependent on whether gross profits can be expected to be large enough to cover capital costs or not. In this ex ante sense capital costs are as important as variable costs for wood demand.

Owing to the high transportation costs for wood, a pulp and paper producer is dependent on the forests in the vicinity for cheap supplies (i.e. a low mill cost). If the nearby forest owners can be expected to cooperate in order to raise the wood price after an investment in new wood-processing capacity has been made, forest companies will be reluctant to undertake the investment, even if a project evaluation based on present wood prices shows substantial profits. Ex post, there is a risk that a less than normal return on the invested capital will be earned or even that there will be a financial crisis.

The expansion of the pulp industry in the south of Sweden can serve as an example of how investment decisions are affected by these small-numbers exchange considerations. In 1952 a government commission verified that the wood resources in the south permitted a substantial increase in pulp capacity. The backward-unintegrated companies were, however, unwilling to undertake this expansion. With company purchases of private woodlots prevented by the law and the time period in cutting rights limited to a maximum of five years, there was no transactional arrangement available that made it possible to forecast wood costs and avoid small-numbers exchange problems during the depreciable life of a pulp plant.<60>

There was, in other words, no transactional escape from the risk that a strong sellers' organization ex post could capture part of the quasi-rent necessary for a normal return on the invested capital. To achieve a desired increase in pulpwood demand in the south, Södra Skogsägarna, the foa in this part of Sweden, had to make the investment in new pulp capacity itself (i.e. to vertically integrate forwards).

5.5 Effects of Transactional Restrictions

In Section 2.3.4 it was shown that a short-term contract is not an efficient transaction mode in small-numbers exchange situations. Long-term contracts or ownership solutions are required. Long-term contract type cutting rights and outright ownership of forests represent in this connection two alternative transactional arrangements in the wood market.

During the last century it was possible to obtain 50 years cutting rights (see Section 5.2.1). It was when the maximum time periods in these rights were successively reduced to 5 years, that the forest companies first became interested in acquiring forest land on a larger scale. Later, in 1906, backward integration in form of purchases of private forest land was also forbidden.

After that a concentration and cartelization of the market took place. The f.o.a.s grew up in the 1930s as a countervailing power to already existing purchasing cartels. A wood market characterized by small-numbers exchange and uncertainty emerged.

Vertical integration is likely in such a trading situation to be the most efficient mode of assuring that a quantity of wood corresponding to a joint profit maximum will be processed. Even if this quantity could be assured in a contractual agreement on both price and quantity of wood, there are transactional benefits that favour a vertical integration solution. The annually recurring costs of negotiating and enforcing price and other delivery terms of a long-term delivery contract in an uncertain exchange environment are replaced by the one-time costs of acquiring forests (backward integration) or the one-time costs of acquiring wood-processing capacity (forward integration).

5.5.1 Present Transactional Alternatives to Backward Integration

Due to the restrictions in the Land Acquisition Acts, the forest companies do not have the same opportunity as f.o.a.s to vertically integrate. Small-numbers exchange situations have instead to be responded to by transactional arrangements such as cutting rights with a 5-year maximum time period (stumpage contracts) and long-term delivery contracts.

Stumpage contracts represent the contract form most similar to ownership regarding disposability or use of the forests. Within the contracted time-period (maximum 5 years) the forest company has the same freedom as in its own forests to adjust the logging to seasonal and annual variations in the market supply and demand for wood.

By stumpage contracts distortions in marginal cost and marginal revenue due to market power are avoided for a limited time period. Stumpage sales are bargained individually with the private forest owner. Consequently, the average domestic wood price is not influenced in the same way as in purchases according to delivery contracts. Furthermore, marginal costs in the form of logging costs are more stable than the wood prices.<61> Within the contracted time period, the stumpage contracts therefore facilitate the planning of costs in the same way as in vertical integration and monopsony power distortions are also avoided.

The disadvantage of the stumpage contract is the limited time horizon. The contracts have to be negotiated frequently as the maximum time period is 5 years. The present value of expected delivery prices is likely to serve as lower ceiling in these individual negotiations. The price per cubic metre of wood in a stumpage sales contract tends therefore to exceed that of a delivery contract.<62> With delivery prices quoted delivery at motor road, purchase of standing timber will be most profitable for forests in the vicinity of a mill (i.e. with lower transportation costs).

An alternative way to assure supply is to conclude long-term delivery contracts.<63> The price of wood in these contracts tends to be lower than in stumpage sales. A disadvantage compared with stumpage contracts and vertical integration is the lack of adaptability. A long-term delivery contract schedules the supply of specified quantities during a certain time-period. In the pulp and paper industry it is difficult to forecast how the demand will develop for a longer time-period. By relying on long-term delivery contracts there is either a risk of larger increases in inventory or shortages of wood (i.e. costs of reduced flexibility).<64>

Another disadvantage compared to stumpage contracts and vertical integration is that costs cannot be as well-planned. In a long-term contract it is only quantity and not prices that are determined for a longer time-period. The prices paid for the wood delivered according to the long-term contracts are equal to those determined in the annual negotiations between the f.o.a.s and the wood purchasing organizations and will consequently fluctuate as much as in short-term delivery contracts.

To sum up, for a private forest company stumpage sales contracts and long-term delivery contracts are nowadays the only transactional alternatives to short-term contracts in small-numbers exchange situations. By stumpage contracts distortion in short-run marginal costs and short-run marginal revenues for market power reasons can be avoided for a limited time period of up to 5 years. In those forests where the cutting right according to a stumpage contract has been acquired, a company can adapt its logging to the variations in its wood demand. In this respect the forest company, for a limited time period, obtains a freedom of use similar to ownership.

The disadvantages of a long-term delivery contract compared with a stumpage sale are the lack of flexibility in wood deliveries to the mill and difficulties in planning the development of wood costs. The deliveries of contracted wood quantities are scheduled and the prices follow those determined in annual negotiations.

In small-numbers exchange situations stumpage sales contracts and long-term delivery contracts are inefficient transaction modes compared with cutting rights valid for a longer time period and company ownership of forests. The depreciable lives of investments in infrastructure or in pulp plants are much longer than the time-period during which a stumpage contract is valid and during which it would be possible to conclude a delivery contract with a fixed price or a price clause.

All wood contracts have therefore to be renegotiated many times during the depreciable life of, e.g., a pulp plant. New stumpage contracts have to be concluded frequently and the prices in delivery contracts are negotiated every year. There is thus no way open for a wood-processing company to avoid the risk that a substantial part of the quasi-rent of a long-lived specialized investment will be appropriated by organized wood suppliers.

In addition, in order to prevent small-numbers exchange situations with shortages of domestic wood arising during booms, it is important for companies with small forest resources of their own to be able to conclude cutting rights agreements for longer time periods than 5 years. A cutting right permits the company to adapt wood supplies to

variations in pulp demand in a way that is not attainable in a long-term delivery contract. The present short time period for cutting rights increases the costs of negotiating these contracts considerably.

5.5.2 Forward Integration as a Response to Legal Restrictions

As backward integration is prevented by the law, integration in response to small-numbers exchange situations has to be forwards. The natural partners in this forward integration have been the f.o.a.s, which organize many of the numerous small and scattered private forest owners and have the necessary financial strength to acquire and build pulpmills.

The f.o.a.s are formed as producer cooperatives with a majority rule voting system where each member-supplier has one vote in the election of the board of directors.<65> The primary objectives of the foa:s are to take care of the interests of the members in securing demand and high wood prices. All private forest owners within a certain region are eligible according to the statutes for membership in the cooperative. For membership a nominal fee is paid. These fees together with reinvested profits determine the size of the own capital of the foa. A member cannot in the same way as a shareholder in a corporation capitalize future profits by sale of his/her ownership right. It is only the nominal fee that can be recovered if membership is terminated.

It should be noted that forest land is owned by the associated members and not the f.o.a as such. An acquisition of pulpmills by a f.o.a implies an integration between forestry and pulp production in the sense that there is common ownership of assets in both the stages. Associated private woodlot owners have an indirect ownership in the pulp stage through their membership in a forward-integrated f.o.a. But there is no scope for coordinating activities in the two adjacent stages through centralized decision-making in the way that is possible in a backward-integrated forest company with employed forest workers. The f.o.a.s cannot unilaterally decide how much wood there is to be cut in the members' forests.

It is thus primarily savings in transaction costs due to disparate ownership interests in the division of the joint profit of the wood and pulp stages that can be achieved by forward integration of the f.o.a.s. The control and planning advantages of an integrated firm are not achieved. As there is no employment relationship between the member-suppliers and the forward-integrated f.o.a., the associated forest owners have to be persuaded via wood prices and different moral and solidarity arguments to cut a certain quantity of wood.

During a boom there is thus not the same possibility as in a backward-integrated corporation of simply giving orders to increased logging in its own forests. Resources must instead be spent on persuading the members to voluntarily increase their logging. That the outcome of such a campaign is uncertain is illustrated by the difficulties faced by the f.o.a.s in obtaining enough wood during the 1979-1980 boom.

The wood supply problems are aggravated by the principle of equal net prices for all supplying members. This principle can be seen as a result of the majority rule with one member-one vote and the attempt to get as many as possible of all the forest owners within a region as members, since it is important for bargaining strength to organize as much of the total wood supply as possible.

The fairness principle of equal net price implies that the f.o.a.s cannot to the same extent as other private companies act in the market for stumpage sales contracts or use, e.g., price discrimination when charging for logging and afforestation activities as means of obtaining more wood deliveries.<66> With no stumpage contracts, an opportunity to adapt supply more closely to variations in internal wood demand through centralized cutting decisions is missed.<67>

There are also certain tax considerations that favour backward integration. The higher fixed costs of a backward-integrated company means larger provisions for depreciation. By varying the deductible depreciation in the pulp and paper stages, the tax consequences of large profits in the integrated forestry stage can be mitigated. More trivially, backward integration implies a saving of resources for taxation in the forestry stage. Furthermore, the state company tax has, in contrast to the state income tax, no progressive scale. There will therefore not be the same marginal tax consequences of increased

cutting as in the case of the wood sales of the private forest owner. Marginal taxes have been claimed to be one of the reasons why private forest owners hesitate to increase their cuttings substantially during booms.<68>

Another important inefficiency in forward integration compared with backward integration by a pulp and paper corporation is that companies owned by f.o.a.s tend to have much lower ratio of equity capital to total capital than other forest companies. In 1977 for example, figures for the eighteen largest Swedish forest companies show an equity ratio of nine per cent in the companies owned by f.o.a.s compared with an equity ratio of thirty per cent in the other forest companies.<69> With a low equity ratio the risk of financial crisis increases.

If there had not been large subsidies from the state, all f.o.a.s would have gone bankrupt after the recession that started in 1976. In 1977 and 1978 the losses after depreciation and deductions for interest in the three pulp and paper producing companies owned by foas (Södra Skogsägarna, Ncb and Vänerskog) amounted to 755 and 799 millions SEK respectively, which for 1977 corresponds to a net margin of -15.2 per cent compared to -1.9 for the 13 largest private companies.<70> In a cyclical business with high fixed costs such as the pulp and paper industry it is thus hazardous to have too low ratio of equity capital to total capital.

There are several reasons for this low equity ratio.<71> The share of the residual that a member-supplier can appropriate stands in direct proportion to how much wood he has delivered relative to other member-suppliers. No dividends are paid on equity. Future profits cannot be capitalized in the form of a higher price on the ownership right. Furthermore, absentee ownership is not allowed in the f.o.a.s and is not attractive in subsidiary forest companies as most of the profit is likely to be captured in the form of high wood prices.

To sum up, because of (i) no opportunity to exert direct control of the logging activities of the member-suppliers, (ii) tax consequences and (iii) the increased risk of bankruptcy, forward integration by f.o.a.s is likely to represent a more inefficient response to the integration incentives in the Swedish wood market than backward

integration.

5.6 Earlier Work in Light of the Transaction Approach

The most thorough Swedish analysis of the motives for vertical integration in forestry is Wohlin (1970). Wohlin's research shows that felling activity is lower on private woodlots than in company-owned forests so that forest resources especially in southern Sweden are underutilized. According to Wohlin this implies a non-optimality of large magnitude as the stumpage values are highest on private woodlots in general and in southern Sweden in particular. The results indicate also that the question of integrated or separate ownership has an important economic impact.

In his Chapter 7 Wohlin tries to explain the differences in felling activity by a monopsony model and the underutilization of wood resources in the south by a bilateral monopoly model. Despite a lack of references to transactional literature it can be claimed that Wohlin's analysis to a large extent is transactional in its nature. The transaction-specific nature of investment in new pulp capacity in a bilateral monopolistic wood market and the problems of ex post appropriation of the quasi-rents are recognized.

The use of long-term contracts as an alternative to vertical integration in the depicted small-numbers exchanger situations is not, however, analyzed in transaction cost terms. In the monopsony model analysis, long-term contracts as an alternative to backward integration are not even mentioned.<72> It is only demonstrated how a company by purchase of private woodland can increase profits by attenuation of monopsonistic distortion in marginal cost curves. That the same result can be obtained by purchase of long-term cutting rights is not considered.

In the bilateral monopoly analysis of investment in new pulp capacity, Wohlin excludes the long-term contractual alternative with the explanation that private forest owners are in general unwilling to make such agreements.<73> The transactional reasons for this unwillingness are not, however, presented.

It is thus not explained that the difficulties in concluding long-term contracts are due to the legal restrictions on the use of the most appropriate contract-type in small-numbers exchange situations viz. cutting rights (stumpage contracts). Because of the legal hindrance against use of cutting rights of longer durations than 5 years, long-term delivery contracts are in practice the only alternative to vertical integration.

The transaction costs of a long-term delivery contract considerably exceed those of a cutting right, as it is a more specified type of contract. Dates of delivery, quantities and qualities to be delivered, degree of processing, and prices for each future delivery are examples of items that must be specified in advance. The costs of negotiating all these terms for a time span amounting to decades are immense for a business cycle sensitive product such as wood. The contract will also be costly to enforce, as new unforeseen events are likely to occur. The large appropriable quasi-rent invites, in this situation, to ex post opportunistic and strategic behaviour. This is to be contrasted with a cutting right where only a value for the right to use the wood within a forest area during a certain time span is to be agreed upon.

Wohlin's bilateral monopoly analysis is recapitulated in Lönnstedt (1977). Lönnstedt's primary objective is however to provide an institutional description of the Swedish roundwood market and not to analyze the effect on wood supply of different ownership arrangements.

Economic historians such as, e.g., Schager (1925b) and Stridsberg and Mattsson (1980) have studied company acquisitions of cutting rights and ownership rights to woodland in the vicinity of floatable rivers. In their analysis, however, they omit the small-numbers exchange explanations of these acquisitions.

The investments necessary for making rivers floatable were large and of a transaction-specific nature. By achieving long-term cutting rights and ownership rights the companies could be more assured of obtaining at least a normal rate of return on the transaction-specific investment. Without access to these transactional arrangements the forest companies would not have been as willing to make investments in floating facilities and the expansion of the Swedish forest industry would have been less rapid. The increases in the price of forest land

at the end of the 19th century were mainly as a result of these transaction-specific investments.

The difficulties during 1979-1981 in getting enough wood to the Swedish forest industry have been studied recently in two official reports (Virkesförsörjningsutredningen SOU 1981:81 and Strukturutredningen SOU 1983:71). SOU 1981:81 observes the sharp decreases in private fellings since the mid-1970s. In spite of substantial price increases the supply from private forest owners did not increase notably during the 1979-80 boom. Different reasons for this increased inelasticity of domestic wood supply are discussed viz. tax considerations, high inflation and restrictions on supply caused by the Silviculture Act.

Differences in felling activity between various categories of private forest owners are also recognized. These observed differences have been used in a subsequent report, SOU 1983:71, as a motive for an increased regulation of the trade in woodland with the objective of favouring active ownership categories. This proposal has since been criticized by Bångman and Hultkrantz (1984) as ineffective compared with a free trade of woodlots between individuals (i.e. company purchases would still be excluded).

None of these studies consider the small-numbers exchange situations that are likely to arise during booms, when the demand for wood is rapidly increasing. The proposed measures of changes in tax rules, new regulations, deregulation and new subsidies may have a positive effect on the felling activity in private forestry. But they are unlikely to prevent future "shortages" of domestic wood. These "shortages" are primarily a result of the monopsonistic power of the forest companies and the legal restrictions that make it impossible to conclude proper transactional arrangements.

If the companies were allowed to conclude long-term cutting rights and increase the degree of backward integration by purchase of private woodlots, the supply could be adjusted to demand without larger short-run effects on the domestic wood price (i.e. small-number exchange situations of the sort encountered in Section 5.4.3 could be avoided). An illustration of the validity of this transactional analysis is that the forest companies with the highest self-sufficiency of wood, were

also those least affected by "wood shortage problems" during the boom in 1979-80.

5.7 Summary

In this chapter it has been shown how transaction costs and delimitation of property rights determine the choice of institutional mode in wood transactions.

The most important changes in forestry property rights took place at the turn of this century. The expansion of the wood- processing industry started in the middle of the 19th century. At first there were no severe restrictions on the transferability of ownership rights to the forests. Contracts with cutting rights running for a maximum time period of 50 years could be concluded and the forest companies were free to buy forests from anyone who wanted to sell. At the end of the 19th century strong political opinion for restrictions in the transferability of forest property rights started to grow. The maximum time period for cutting rights was successively reduced to 20 years and in 1905 to 5 years. Five years is also the maximum time period in today's stumpage sales contracts.

After the reductions in maximum time periods for cutting rights, the the forest companies became more interested than before in acquiring private woodlots.

In 1906 a law was issued that prohibited company purchases of the subsistence forests of the farmers in upper Norrland. This law was successively enlarged to encompass the whole of Sweden. Still, today, backward integration is severely restricted in the Land Acquisition Act of 1979.

The wood market of today is characterized by a rigid ownership structure in forestry. The division of the forest area between companies, private woodlots and the state has not changed much since the first Land Acquisition Act of 1906. The highest degree of backward integration can be found in the north and in the central Sweden.

The contract form most similar to backward integration in terms of the disposability of forests is the stumpage sales contract. Delivery contracts represent another contract type where prices per m^3 , qualities, quantities and other delivery terms are well specified (cf. Table 4.2). The prices in delivery contracts are regionally determined in annual negotiations between forest owners' associations and wood purchasing organizations.

High transportation cost relative to wood value and bilateral market power create a situation of small-numbers exchange in the Swedish pulpwood market (cf. Table 4.1). There is small-numbers exchange both between an individual seller and buyer located in close proximity to each other and between groups of buyers and sellers that are organized in associations. The bargaining scope is ultimately determined by the high costs relative to value of transporting wood.

Since by far the largest joint quasi-rent is earned in nearby pulpwood transactions, investments in new pulp capacity are not likely to take place without some sort of guarantee that supplies from nearby forests will be made at terms that at least give a normal return on invested capital. Long-term cutting rights and common ownership (i.e. vertical integration) provide such a guarantee.

However, backward integration and use of long-term cutting rights are prevented by the law. Forest companies, therefore, only have access to different forms of stumpage contracts and long-terms delivery contracts as contractual alternatives in small-numbers exchange situations. Within the contracted time period (maximum 5 years) a stumpage contract represents the same freedom to adjust logging to variations in pulp demand as does vertical integration. Because of the limited time horizon, the savings in transaction costs are in most instances likely to be smaller than in backward integration and cutting rights of longer duration. Long-term delivery contracts, in turn, tend to be cheaper than stumpage contracts but offer no adaptability to changes in the derived wood demand. The wood price fluctuates just as in short-term delivery contracts.

The forward integration of the forest owners' associations can be explained simply as a response to small-numbers exchange situations. Because there is no opportunity to exert direct control over logging activities, tax consequences and the increased risk of bankruptcy, forward integration can be claimed to represent a less efficient response to integration incentives in the Swedish wood market than backward integration.

Notes

1. Roundwood and sawmill waste are the two wood fibre inputs of the pulp industry. Roundwood accounts for 75 per cent and sawmill waste for 25 per cent of total wood fibre consumption.

The roundwood used as pulpwood are trees that are of a small dimension or for other reasons not useful as sawlogs. Part of this supply of roundwood is obtained from thinnings.

The second wood fibre source is sawmill waste. Only about 50 per cent of the wood volume under bark of a sawlog is processed to sawn wood (see Skogsstatistisk årsbok 1980, pp. 115 and 121). The remaining part of the log becomes sawmill waste. The sawmill waste consists of wood chips (sågverksflis) (on average 71 per cent of the waste), sawdust (sågsplån) (20 per cent), slabs (bakar) and edgings (ribbor).

2. Unless otherwise stated, this section is based on Arpi (1959, pp. 14-17 and 68-74).

3. "recognition" forests were forests owned by the state in which ironworks had the right to use the wood (i.e. a usufruct) for charcoal production and construction wood for mines and mills.

4. "recognition" fee was the fee paid for the right to use the wood of the "recognition" forests.

5. See Arpi (1959, pp. 69-70), Söderlund (1952, Chs 1 and 6) and Söderlund (1964).

6. See Schager (1925a, pp. 93-94), Söderlund (1966, p. 55), Gårdlund (1951, p. 51), Althin (1955, p. 40) and Hildebrand (1970, p. 215).

7. See Schager (1925b, p. 97), Arpi (1964, p. 86), Gerard (1971, pp. 17-18) and Stridsberg and Mattsson (1980, pp. 62 and 78).

8. See Schager (1925b, p. 94), Arpi (1959, p. 71), Gerard (1971, p. 15) and Stridsberg and Mattsson (1980, pp. 62, 763, and 78).

9. With a maximum time limit of 5 years, this cutting right is to be considered identical nowadays to a stumpage contract (see also Section 5.3.2).

10. See SOU 1977:93, pp. 28-29 and Skogsstatistisk årsbok 1972, pp. 33-38.
11. See SOU 1977:93, p. 87.
12. See Arpi (1959, p. 163).
13. See Arpi (1959, p. 163) and Stridsberg and Mattsson (1980, pp. 56-57).
14. See Hildebrand (1970, pp. 390-392).
15. Arpi (1959, p. 164)
16. Unless otherwise stated, this section is based on Arpi (1959, pp. 7-21, 29-43 and 564-568).
17. See Arpi (1959, pp. 566-568) and SOU 1978:85, pp. 311-313.
18. See SOU 1978:85, pp. 314-315.
19. See Skogsbönder går samman (1957, pp. 146-150) and Stridsberg and Mattsson (1979, p. 113).
20. See Arpi (1959, p. 222), Skogsbönder går samman (1957, p. 90) and Andersson, Häckner and Lönnstedt (1980, pp. 14-16).
21. Skogsåret 1981, p. 38, Skogsbönder går samman (1957, pp. 79, 90, 96-100 and 148) and Västerbotten skogsägarförening 1933-1973, p. 23.
22. As a graphical illustration of the role of the private forest owners as marginal suppliers of the industry see the figures on pp. 80-81 in Ruist and Svennilson (1948).
23. See Skogsbönder går samman (1957, p. 108), Skogsåret 1981, p. 41 and Larsson and Persson (1978, p. 25).
24. Concerning vertical integration as a way of avoiding the inefficiencies of a bilateral monopoly, see Section 3.2.
25. Skogsbönder går samman (1957, p. 109), Larsson and Persson (1978, p. 2) and Andersson, Häckner and Lönnstedt (1980, Ch 6).
26. See SOU 1973:14, pp. 115-116.
27. See Andersson, Häckner and Lönnstedt (1980, pp. 20-24).
28. Among the big private companies is included the forest company Fiskeby AB owned by the consumer cooperative KF.
29. Since 1979 the state has been majority owner of Ncb. Before 1979 the company was 100 per cent owned by f.o.a.s in the north.
30. Norrland together with Kopparberg County and Uppsala County are assigned to the northern part, while the south corresponds to the rest of Sweden.

31. See Skogsstatistisk årsbok 1980, p. 59.
32. See Skogsåret 1982, p. 27.
33. See SOU 1981:81, p. 98.
34. See Skogsstatistisk årsbok 1980, p. 121.
35. Ibid., pp. 115, 113 and 150.
36. See, e.g., Lönnstedt (1977, pp. 21-22).
37. In the north, the delivery contracts used to be negotiated delivery at mill or separated and format sorted at river, while in the south the prices have for a long time been quoted delivery at motor road. Now the prices are quoted delivery at motor road also in the north with the qualification that the pulpwood in price region 1 is quoted delivery at E4 (E4 is the big highway through Norrland, see Skoglig statistikinformation 1983 no. 537). Delivery at motor road means the forest owner only has to bear the cost for transportation of the wood to nearest motor road.

Concerning the share of delivery contracts in total wood purchases - the official price statistics only contain figures for coniferous saw logs in 1979 (see Skogsstatistisk årsbok 1984, p. 119). According to these statistics, 70 per cent of all purchases were in the form of delivery contracts.

To get an idea of the corresponding share for pulpwood, the wood fibre consumption in four of the largest Swedish pulp and paper companies have been studied (sources are Annual Reports and collected materials). These four companies together used 13.3 millions m³ pulpwood in 1979, which is about half the total Swedish consumption. 7.3 millions m³ was bought in the market, of which the share for delivery contracts amounted to 5.5 millions m³ (i.e. about 75 per cent of total purchases).

38. See SOU 1973:14, p. 112.
39. See Lönnstedt (1977, p. 23).
40. Interview with Ragnar Thulin (Iggesund).
41. The state subsidies to stockpiling during 1975 to 1976 motivated by employment reasons were not directed towards the stocking of a raw material such as pulpwood at the mills.
42. Concerning problems in 1974 see Brege (1979, p. 45).
43. See Skogsåret 1979, p. 30, SOU 1981:81, pp. 43, 54 and 112 and SCPF Annual Report 1980, p. 10.
44. See the Annual Reports for 1980.
45. See SOS Utrikeshandel 1979 and 1980.
46. See Skoglig statistikinformation 1983 no. 537.

47. See also SOU 1981:81, pp. 99-101.

48. See, e.g., Wonnacott and Wonnacott (1979, pp. 648-650).

49. Both figures provided by Eklund (1977) and a comparison of transportation costs for chipped wood in OECD (1982, p. 17) with the transportation costs for sulphate pulp in Ds I 1979:5, p. 399 show this relationship.

50. See Dfe rapport nr 29, 1980, pp. 35-39.

51. Ibid., pp. 19-21.

52. See Ds I 1979:5, pp. 330-332.

53. See Skogsindustrins nuläge och framtid (1976, pp. 47-48).

54. The right to first refusal is regulated in a clause in the articles of association, which states that a member can on request be obliged to sell all wood to the f.o.a., while the f.o.a. has no reciprocal duty to buy (see Pris- och kartellfrågor, nr 7, 1968, pp. 20-21, Lönnstedt, 1977, p. 12 and Andersson et al., 1980, p. 44). By this clause it is thus formally possible for the f.o.a. to control the wood supplies from associated forest owners. In practice, this clause has seldom been implemented (see Andersson et al., 1980, p. 44 and Lönnstedt, 1977, p. 12). Stockpiling of wood and increasing its own processing are other means by which a f.o.a. can temporarily prevent increases in wood supplies to the association resulting in lowered wood prices.

55. Brännlund, Johansson and Löfgren (1984) have estimated the cross elasticity between the supply of pulpwood and the price for saw timber to be -0.13 (i.e. a 10 per cent increase in the saw timber price lowers the supply of pulpwood by 1.3 per cent). The negative sign can be explained by efforts to increase the proportion of saw timber obtained from each logged tree.

The estimated cross elasticity is, however, not significant at the 95 per cent level and it is not evident that the sign should be negative. Every final felling automatically brings with it some amount of pulpwood. As the stumpage value received from the sale of saw timber is much higher than for pulpwood, there is reason to expect that the decisions on final fellings are primarily influenced by changes in the saw timber price (see Killander, 1984, p. 22). In this perspective increased saw timber prices should instead increase the supply of pulpwood.

56. See Wohlin (1970, p. 137).

57. In the reservation price of a resource "both the cost of harvesting or extracting the resource today and the amount necessary to compensate for the reduction in the resource available in the future" will be considered (see Wonnacott and Wonnacott, 1979, p. 649). In the present case this implies that the future value of wood as well as logging and transportation costs will be reflected in a forest owner's reservation price.

58. Killander (1984) mentions other factors that explain why the shortages of supply continued in 1981, after the boom had ended. The high inflation rate and political decisions about future decreases in marginal taxes are two such factors that most likely made the supply curve more inelastic. Expectations of higher future saw timber prices could have contributed in making the forest owners reluctant to undertake final fellings. The financial crisis in the f.o.a.s is another factor that could have negatively affected the supply of pulpwood.

59. See Ds I 1979:5, pp. 359-360 and SOU 1981:81, p. 99.

60. The depreciable life of a plant can be estimated at about 30 years (see Eklund, 1977, p. 8).

61. Cf., e.g., Figure on p. 196 in Skogsstatistisk årsbok 1983.

62. See, e.g., MoDo Annual Report 1980, p. 14 and Johansson and Löfgren (1982, p. 1).

63. See, e.g., Brege (1979, pp. 44-46).

64. An example of this can be found in Brege (1979, p. 45).

65. See, e.g., Andersson et al. (1980) and Bjuggren (1980).

66. See, e.g., Killander (1984, p. 20) and Brännlund et al. (1984, p. 333).

67. Recall that a stumpage sale involves the transfer of a cutting right type usufruct that makes it possible to cut with one's personnel whenever it is deemed desirable within a time period of a maximum of 5 years.

68. See SOU 1981:81, p. 96.

69. See Regeringens proposition 1978/79:207.

70. See Regeringens proposition 1978/79:207. Net margin = profit after depreciation and deductions for interest in percentage of sales.

71. See Bjuggren (1980).

72. See Wohlin (1970, pp. 140-143).

73. Ibid. p. 152.

6 INTEGRATION BETWEEN PULP AND PAPER

6.1 Introduction

Integration with forestry was considered in Chapter 5. Here in Chapter 6 integration between the next two stages in the production chain, i.e. integration between pulp and paper production, is dealt with. The purpose is to explain the high degree of vertical integration between pulp and paper using a transactional approach. During the last 20 years, the degree of forward integration has been progressively increasing in the Swedish pulp industry. In 1960 35 per cent of pulp production was vertically integrated with domestic paper production. This figure had increased to 62 per cent in 1982 (see Table 6.2).

The chapter begins with a presentation of the different pulp grades produced in Sweden and their use in paper production (Section 6.2). The extent to which the different pulp grades tend to be integrated with paper production is also shown. Statistics on the integration trend in Sweden during the last 20 years and on integration in Sweden compared to its main competitors are provided in Section 6.3. Contracts used by Swedish forest companies in their pulp sales are considered in Section 6.4.

Small-numbers exchange. More than half of Swedish pulp production is delivered to technically-integrated paper mills. Technological interdependencies between pulp and paper production and their implications for the choice of transactional arrangement are studied in Section 6.5 The capital-intensive pulp industry is very sensitive to variations in operating rates and unit gross profit. It is therefore important to have an assured pulp demand, especially on nearby markets where the quasi-rents are highest. The advantages of vertical integration in this respect are described in Section 6.6. Section 6.7 summarizes the chapter.

6.2 Woodpulp Grades <1>

Due to dissimilarities in the production process a crude division is usually made between mechanical, semi-chemical and chemical pulp. Mechanical pulp is manufactured by wet grinding of roundwood or by passing chips through disc refiners. The type of wood predominantly used is spruce.

A special type of mechanical pulp becoming increasingly popular because of its strength and high wood yield is thermomechanical pulp. In the production of thermomechanical pulp, wood is steamheated before passing through disc refiners. Semi-chemical pulp is produced by a combination of chemical and mechanical treatment. As raw material in Sweden mostly hardwood such as birch and beech is used

The two main chemical pulp grades are sulphite and sulphate pulp. Sulphite pulp is manufactured by boiling softwood chips, mainly from spruce, under pressure in boiling liquids consisting of sulphur dioxide and a base dissolved in water. If magnifite is used as a base, hardwood can be used as well as softwood. Other advantages of using magnifite are a shorter digesting time and recycling of the chemical solution.

Sulphate pulp is obtained by boiling softwood or hardwood chips under pressure in a liquid containing sodium hydroxide and sodium sulphide. The chemical solution is recycled and the digesting time is only half that of sulphite pulping (with the exception of magnefite sulphite). Other advantages of the sulphate process are that practically all wood species and wood of inferior quality such as decayed wood can be used as raw material. In Sweden it is primarily pine, sawmill chips and birch that are pulped.

The sulphate method gives a strong pulp, especially if nordic softwood is used, and is therefore often denoted kraft pulp. Unbleached coniferous sulphate pulp is predominantly used in paper products requiring strength such as linerboard and sackcraft. Non-coniferous sulphate pulp has a good opacity and is therefore used in the production of fine paper.

Sulphite pulp is softer than sulphate pulp and is consequently often used in tissue production. Mechanical pulp has a high wood yield because the lignin in the wood is not removed. Due to the high ligning content, paper made from mechanical pulp will gradually turn brittle and yellowish. Examples of the uses of mechanical pulp are newsprint, magazine paper and paperboard.. Semi-chemical pulp is used mainly for fluting and dissolving is used in the production of rayon fibre, which is an input to the textile industry.

In Table 6.1 the quantitative importance of different pulp qualities, domestic integration, deliveries to the home market, exports and primary uses are shown for Sweden. Sulphate pulp is the most important pulp grade. Its dominance is explained by (i) low pollution because of recycling of the used boiling liquid, (ii) vast economies of scale, (iii) superior strength (especially when nordic fibre-dense wood is used), and (iv) the complementary use of wood to the sawmill, mechanical pulp and sulphite pulp industry. Unbleached sulphate pulp is mostly integrated with the production of kraftpaper and kraftliner. Bleached sulphate pulp, which is input to less standardized grades such as fine paper, folding boxboard and tissue, is the leader in both market and export pulp.

Table 6.1 Production and Deliveries of the Swedish Pulp Industry.
Average Values 1973-1977 (Million tonnes per year).

Pulp quality	Production	Deliveries:			Primary uses
		Domestic: Intra- firm	Market	Exports	
Mechanical pulp	1.68	1.24	0.08	0.36	Newsprint, magazine paper, unbleached tissue and folding boxboard
Unbleached sulphite pulp	0.58	0.34	0.04	0.20	Newsprint, magazine paper, unbleached tissue and greaseproof paper

Table 6.1 - Continued.

Bleached sulphite pulp	0.75	0.18	0.12	0.45	Fine paper and bleached tissue
Unbleached sulphite pulp	2.23	1.66	0.01	0.56	Kraftpaper (primarily sack-craft) and kraftliner
Bleached sulphate pulp	2.84	0.61	0.24	2.01	Fine paper, bleached tissue and folding box-board
Semi-chemical pulp	0.34	0.32	-	0.02	Fluting
Dissolving pulp	0.27	-	0.05	0.22	Rayonfibre and cellofan
All grades	8.69	4.35	0.54	3.82	

Source: STU Information no. 149, 1977, p. 77.

Note: Exports include deliveries to subsidiaries abroad.

Different product categories of bleached sulphate pulp are northern softwood/hardwood and southern softwood/hardwood. Northern softwood/hardwood is the superior quality of pulp made of wood that has grown relatively slowly in northern latitudes such as Scandinavia. Southern softwood/hardwood is produced of wood from southern latitudes such as Brazil and the southern part of United States. The highest prices are paid for northern softwood and the lowest for southern hardwood. The different categories are to some extent interchangeable as raw material in paper production.<2>

Sulphite pulp shows the same relationships as sulphate pulp for bleached and unbleached pulp. The unbleached pulp is integrated with paper production and the bleached pulp has more of a market pulp character.<3> Mechanical pulp is also mainly integrated with paper production. Two extremes are found for dissolving and semi-chemical pulp. Semi-chemical pulp is almost completely integrated with fluting and dissolving pulp is one hundred per cent a market pulp.

6.3 The Integration Pattern

The integration between pulp and paper is measured here in two different ways: viz. integrated or captive pulp as a share of total production and as a share of total capacity. <3> While the production figures show the actual degree of integration, the capacity figures show the potential degree of integration.

During the last twenty years the degree of forward integration from pulp into paper production increased in Sweden. In 1960 only 35 per cent of total Swedish pulp production was captive pulp (see Table 6.2). By 1982 this figure had increased to 62 per cent. Among the different grades, it is chemical pulp, bleached and unbleached that show the largest increases. Most of this rise in the degree of forward integration reflects an increase in direct technical integration.

Table 6.2 Forward Integration in the Swedish Pulp Industry, 1960-1984 (%).

Grade	1960	1970	1972	1975	1977	1980	1982	1984
Mechanical pulp	55	71	73	77	78	77	78	79
Bleached chemical pulp	13	14	19	18	28	31	36	32
Unbleached chemical pulp	47	60	69	68	82	81	84	86
Semi-chemical pulp	81	93	93	92	94	95	100	100
<u>Dissolving pulp</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
All grades	35	46	49	47	57	59	62	59

Source: Annual Reports from SCPF (Svenska Cellulosa- och Pappersbruksföreningen)

Note: Forward integration is calculated as captive pulp as a percentage of total pulp production.
By captive pulp is meant pulp domestically integrated with paper production.

Technical integration refers to the case where the pulp and paper stages are built together (see Section 6.5). The pulp is then pumped through pipelines to the papermill. (Pulp produced in technically-integrated mills is henceforth called "pumped" pulp.) A report by the Swedish Pulp and Paper Association (Svenska Cellulosa- och Pappersbruksföreningen, SCPF) (Energiförbrukning i massa- och pappersindustrin 1979, SCPF 1979) shows that in the boom years 1973 and 1979, 47 and 52 per cent respectively of the total Swedish pulp production consisted of pumped pulp.<4> Among the different pulp qualities, technical integration is more common for mechanical than for chemical pulp. In 1979 77 per cent of the total Swedish production of mechanical pulp was pumped pulp. The corresponding figure for chemical pulp was 46 per cent.

The degree of backward integration, calculated as the share of total fibre consumption provided by the paper companies' own pulp mills, has remained fairly stable around 80 per cent during the last twenty years (see Table 6.3). The only notable trend is the substitution of purchased wastepaper for purchased woodpulp.

Table 6.4 Backward Integration and Fibre Supplies to the Swedish Paper Industry, 1960-1984 (%).

Supply sources:	1960	1970	1972	1975	1977	1980	1982	1984
Backward integration (captive pulp)	79	82	85	84	83	81	82	81
Purchased pulp	14	12	9	9	8	8	8	8
Purchased waste-paper	7	6	6	7	9	11	10	11
Total	100	100	100	100	100	100	100	100

Sources: Svensk skogsindustri i omvandling (1970, p. 226), Pulp and Paper in Sweden 1980 (SCPF statistics), Skogsstatistisk årsbok 1984, p. 145 and SCPF Annual Report 1984.

Note: Purchased pulp is calculated as total market deliveries of pulp minus exports.

Most of the Swedish market pulp is exported. The export share of total deliveries has been fluctuating around 90 per cent for the last twenty years.<5>

The international market on which Sweden is selling about 90 per cent of its market pulp is of small size compared to the total world production of pulp. During the last two decades the share of total world production that has been traded on the international market has varied around 16 per cent.<6> Of the traded volume Canada, Sweden, USA and Finland accounted, in 1979, for 41, 20, 15 and 11 per cent or together for 87 per cent of total exports to OECD- countries.<7>

Sweden has for a long time been the second largest exporter of pulp with a share of 20 per cent of the international pulp market. The most important market for Sweden's pulp exports is Western Europe, which accounted for almost 80 per cent of Sweden's exports in 1979. The biggest competitors are North America and Finland, which account for 33 and 13 per cent respectively of the imports into Western Europe.<8> Sweden's share of the West European imports was 28 per cent, in 1979.

Of the total pulp capacity in the world in 1980, 80 per cent was integrated with paper production (see Table 6.4). As this figure does not include the share of the exports that is captive pulp, the real degree of forward integration is higher. Among the four largest exporters of pulp on the world market, the USA shows the highest degree of integration. Sweden has the lowest degree of forward integration with 57 per cent of pulp capacity integrated with paper production. With regard to bleached sulphate, which accounted for 59 per cent of world pulp exports in 1979, Canada shows the lowest degree of forward integration, 27 per cent, while the highest degree of integration is also in this case to be found in USA, 37 per cent. In Sweden 31 per cent of the capacity for bleached sulphate pulp was integrated in 1980.

Table 6.4 Forward Integration in the International Pulp Industry, 1980 (%).

	USA	Canada	Finland	Sweden	The World
Bleached sulphate pulp	77	27	45	31	59
Total wood pulp	90	68	72	57	80

Source: Pulp and Paper Capacities 1980, FAO.

Note. Forward integration is calculated as captive pulp capacity as a percentage of total pulp capacity.
Captive pulp refers to domestically-integrated pulp capacity.

6.4 Contracts<9>

Pulp is a standardized and storable product of bulk character. production can thus be sold to several different users. Demand varies considerably over the business cycle. Exported pulp is priced in US dollars.<10> For a Swedish producer there are thus fluctuations in prices, inventories and exchange rates as well as capacity utilization to consider (cf. Figure 6.2 and Table 6.8).

The sensitivity to changes in the business cycle and currency fluctuations make it costly to enter into long-term contracts with a fixed price. The supplier as well as the customer runs a risk of incurring heavy losses if such a contract is effectively enforced.<11> Even if a contract is running for as short a time period as three months, there is often a clause that price should be equal to the "world market price" or something similar.

The type of long-term contracts usually used in pulp transactions is the so-called "reservation contract" (reservationskontrakt). In a reservation contract a pulp manufacturer reserves a quantity of X tonnes for a certain customer to be delivered during a time period of, usually, one year. Contracts running for a longer time period such as three years also do exist. In a one year contract the deliveries of the agreed quantity are usually divided up evenly between the quarters of a year. The deliveries during a quarter can be made according to specified dates of delivery or at call.

A reservation contract does not contain an agreement on a specific price. It usually has an "open" price clause that a ruling price for, e.g., similar Scandinavian pulp shall be applied. The specific price and often also other terms of delivery are left to be agreed upon quarterly (cf. Appendix B).

In a quarterly agreement, the prices can be fixed for the whole quarter or be determined from shipment to shipment according to an "open" clause. What type of price a quarterly agreement contains depends to a large extent on the state of business. During a recession the price can be reduced several times during a quarter (see Table 6.9). A buyer may then be reluctant to agree upon a fixed price for a delivery taking place perhaps two months later, when a lower world market price has been established.

The rapidly changing prices during recessions are due to marginal supplies at low prices from North American producers, a widening price span from the lower-priced hardwood pulp and more frequent use of discounts in the pulp sales. During a boom period, when pulp prices are rising, the buyers will be much more positively inclined towards a fixed pulp price for all shipments made during a quarter. A change in pulp price for a certain quarter is then announced by the pulp producer at least one month ahead.

For the pulp producer the reservation contract is a planning instrument for not overbooking capacity during booms and achieving the highest possible operating rates during recessions. It is also an instrument for achieving a stable relationship with customers. The customer can be assured of a certain quantity. The pulp producer will have a faithful customer during times when there is a lower demand for pulp.

A buyer can have the reservation contract as a base contract for, say, 75 per cent of pulp consumption. The remaining 25 per cent is bought on the spot market. With variations of less than 25 per cent in pulp consumption, all reservation contracts can be honoured.<12>

Crucial for the working of the system is that the supplier does not overbook during booms. Furthermore, the price difference should not be too large in relation either to marginal quantities offered by, e.g., North American sellers, or such that it pays to substitute non-Nordic qualities such as, e.g., Southern pine pulp or Eucalyptus pulp, that can to some extent replace Scandinavian softwood pulp in the production of printing and writing paper. It is always possible that a price difference can develop which could threaten long-standing relations.<13> The relationships with customers buying pulp according to reservation contracts can be very long-standing. Examples of twenty years or longer of unbroken business relationships are common.

According to representatives of the pulp producers <9>, the reservation contracts can be considered to be more binding for the supplier than for the customer. If a customer, as an excuse for not taking out a contracted quantity during a quarter, refers to a lack of new orders for his paper, this excuse will in general be accepted. It will not be required that the customer build up excessive inventories of pulp. In a sellers' market (boom) it is more difficult for a producer to find acceptable excuses for not delivering contracted quantities.

However, if it is found out that the customer does not take out a contracted quantity because he or she has bought a cheap marginal quantity elsewhere, that information will not be well-received. Such a customer will have difficulties in getting larger quantities of pulp reserved during booms. This is a way to discipline contract violations (cf. Section 2.3.1). There is also of course the legal possibility of enforcing the acceptance of the contracted supplies. Such steps are, however, unusual and would probably result in the customer being lost for ever.

It is during recessions that buyers do not take out contracted quantities. If the economy starts booming and prices are rising, there is always the possibility that a customer will claim that earlier undelivered quantities should also be delivered. In order to avoid such situations some pulp manufacturers have a clause in the contract which states "if the customer does not take out the contracted quantity during a certain quarter, it will be cancelled".

Reservation contracts are the common way of undertaking business with manufacturers of specialty grades of paper and in nearby markets such as the EEC-area. Producers of high quality paper are more dependant on special pulp qualities than others and are consequently more reluctant to change suppliers. Such a producer will therefore be anxious to enter into reservation contracts.

On more distant markets, where Swedish companies do not have as large an advantage of cheap transportation compared with the North Americans, spot sales are more common. An example of such a market is the Far East. Many of these spot sales are arranged in the market by trading houses such as Elof Hansson and Ekmans. The prices obtained in these spot contracts are usually much lower in recessions and are sometimes higher in booms than the prices in reservation contracts (see Figure 6.4).

6.5 Technical Integration

In the pulp and paper industry technological interdependencies are created when pulp and paper making are built together on the same site (i.e. technical integration). This technical integration is of great importance in the Swedish pulp and paper industry. Of the 57 per cent of total Swedish pulp production that was domestically integrated with paper production in 1979, as much as 52 per cent was produced in technically-integrated mills.

The prevalence of technical integration can be explained by the savings in production and transportation costs that can be obtained. In section 6.5.1 these savings are shown. Section 6.5.2 describes how these cost savings vary between different paper grades.

Owing to low self-sufficiency of pulpwood and pulp economies of technical integration are not available to most paper producers on the European Continent and in the UK. In Scandinavia, however, domestic pulp capacity is not a constraint. Exploitation of the advantages of technical integration has instead been restricted by trade barriers for Swedish paper exports to Western Europe. Section 6.5.3 discusses how these trade barriers have influenced technical integration in Sweden.

The savings in production and transportation costs due to technical integration create a small-numbers exchange situation. This transactional aspect of technical integration is analyzed in Section 6.5.4. The nature of the small-numbers exchange situation is outlined. The bargaining scope and the savings in transaction costs by vertical integration are described.

6.5.1 Economies of Technical Integration

In a technically-integrated mill wet pulp is pumped through pipelines direct to the paper machines. It is also common that the pulp and paper mills use the same discharge system for industrial residues, that there is a cross-linking of process water to the two vertical stages and that the steam and power systems are also integrated. Furthermore, the pulp and the paper mills are often located in the same building.

There are several ways by which costs can be reduced by this technical integration.<14> The most important are the savings in capital costs. The required investments and working capital are smaller. By being able to pump wet pulp to the paper mill a number of activities are eliminated. There is no need for any investment in drying, cutting and baling or reeling, rewetting, defibrizing and refining the pulp before it is used in paper production. There are also savings in the investments required for handling and transportation of the pulp and a reduction in costs for storage installations. Other examples are savings in energy and water systems. Working capital expenses will be smaller because storage of pulp is not needed.

Another source of economies of integration is savings in labour costs. The elimination of the intermediate activities accounted for above, in addition to capital cost savings, leads to a reduction in the number of employees. A higher degree of automation and common administration, maintenance and laboratory departments also reduce the number of personnel required for a given rate of production.

A third source of economies is savings in energy. There are two kinds of energy savings made possible by technical integration. Firstly, there will be no energy for drying the pulp. Secondly, surplus heat from the pulp mill can be used in paper production. The rising oil prices during the 1970s have increased the importance of this source of economies from technical integration. Furthermore, water expenses are reduced by a common system for use of processing water and discharges. The raw material costs are reduced by savings in packaging material for transport of the pulp.

If technical integration means a substitution of paper exports for pulp exports some economies, such as savings in transportation, packaging and sales of the pulp, will be balanced by the additional costs of transporting and selling the paper. As noted, pulp should preferably be produced close to wood resources in order to save on transportation costs. Paper should in general, however, be produced close to the customer in order to save on both transportation and marketing costs.<15> Paper is in most cases more expensive to transport than pulp. The mostly lower degree of standardization of paper grades makes marketing and service important. Marketing and service are best performed close to the market. Finally, a non-integrated paper machine is more flexible in response to special quality requirements.

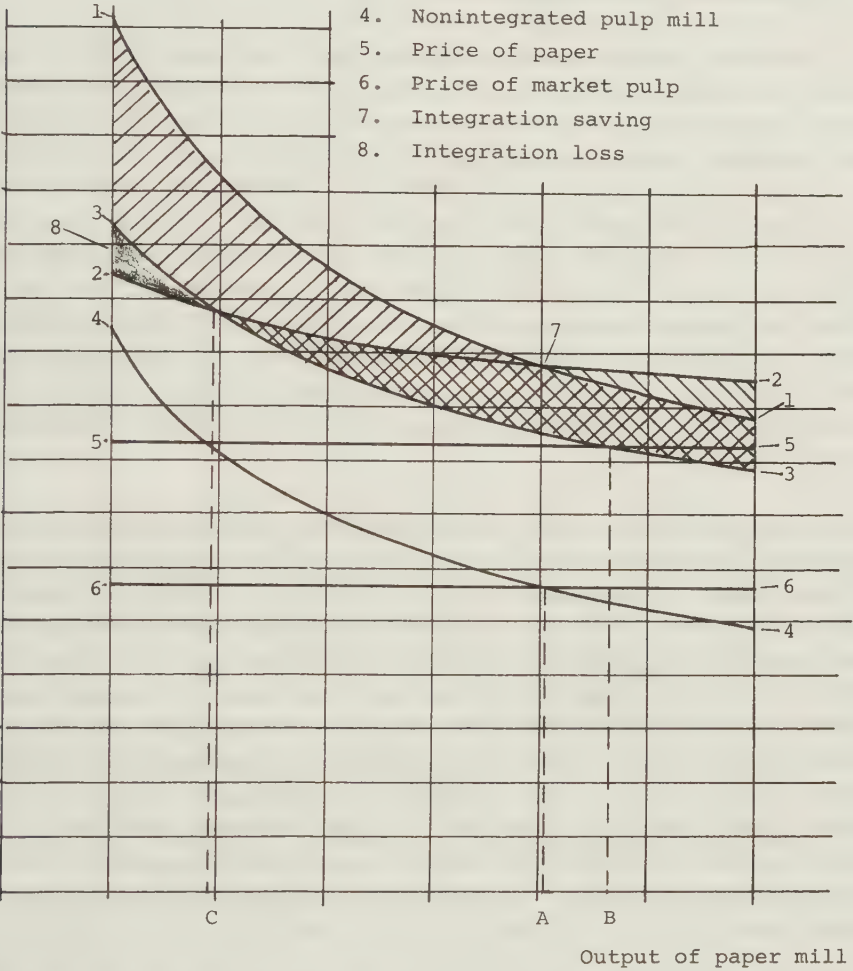
Another factor to consider in technical integration between pulp and paper is the scale of production required to achieve scale economies in both the stages. Figure 5.1 shows that, with larger economies of scale in pulp than in paper production, a certain minimum output is necessary in order to reap economies from technical integration. The economies of scale are different for chemical and mechanical pulp production. The minimum efficient scale is much larger for chemical than for mechanical pulp.<16>

Furthermore, in judging the economies of technical integration it is important to consider the differences in the properties of pumped pulp and dried pulp. The drying process gives a pulp which has less strength and stiffness and from which a more opaque paper can be produced.<17> .

Figure 6.1 A Model for the Comparison of Integrated vs. Non-Integrated Pulp and Paper Production: Manufacturing Costs as a Function of Mill Size.

Manufacturing costs per unit of output in paper

1. Nonintegrated (captive) pulp mill + nonintegrated paper mill
2. Nonintegrated paper mill using market pulp
3. Integrated pulp and paper mill
4. Nonintegrated pulp mill
5. Price of paper
6. Price of market pulp
7. Integration saving
8. Integration loss



Source: Eklund (1972a)

Note: 1 tonne of pulp is apprx. equal to 1.05 tonne of paper.

Employees have more skills to master in an integrated than in an unintegrated mill, since instead of one stage there are two production stages that have to be mastered. Any mistakes mean bigger reductions in gross profits because of the integrated procedure.<18>

6.5.2 Different Paper Grades

The different factors enumerated above, viz. transport and marketing costs for paper compared to pulp, the relationship between the economies of scale in the two stages, the qualities of pulp used as raw material, and the demand for technical mastery, are important in the choice of paper grade to be technically integrated with a certain type of pulp. The paper grades most suitable for technical integration with regard to these factors are bulk products such as newsprint, magazine paper, sackcraft, kraftliner and fluting. Common to these grades is that unbleached pulp is primarily used as fibre material. The production of folding boxboard is also to a large extent technically-integrated in Sweden and during the 1970s Swedish fine paper production has become increasingly integrated with chemical pulp production.

Grades based primarily on unbleached pulp. In the production of newsprint, magazine paper and multi-ply folding boxboard, mechanical pulp is used as fibre material. The limited economies of scale in mechanical pulp production compared with the capacity of the paper machines makes it possible to reap all economies of scale. There is no need to produce pulp for the market. Furthermore, certain valuable properties of the mechanical pulp are achieved when it is pumped wet to the paper mill.<19> Besides mechanical pulp, these paper grades use chemical pulp in the pulp furnish (massamälden) to, among other things, give the paper strength. The proportion of chemical pulp is, however, usually too small to justify technical integration.<20> Most of the chemical pulp in an integrated mill would have to be sold as market pulp.

An indication of the advantages of technical integration in newsprint production is that several of the non-integrated newsprint producer in the UK have been forced to close down. In spite of their proximity to the market they have not been able to survive the competition from Scandinavia and Canada.

Paper grades that are especially suited to technical integration with chemical pulp production, are kraftliner and sackcraft. Semi-chemical fluting is also almost always integrated with semi-chemical pulp production. The economies of scale in paper production and the use of chemical pulp of just a few qualities allow internal use of most or all of the chemical pulp production. Most or all of the economies of integration can then be obtained. Another factor of importance for packaging and wrapping grades like kraftliner and sackcraft is the strength of the paper. With pulp pumped wet to the paper mill it is possible to produce a strong paper. In the case of fluting it can be added that semi-chemical pulp is expensive to dry and the the important stiffness of the paper is best achieved by use of pumped pulp.

Older estimates of the savings from integration for the paper grades such as newsprint and sackcraft mention figures of 12 to 15 per cent of total cost.<22> These savings are probably larger today as among other things the energy savings have increased in importance with rising oil prices and the amount of surplus energy generated in pulp production has increased for all kinds of pulp except thermomechanical pulp.<23>

Grades based primarily on bleached pulp. Paper grades like solid bleached board (a folding boxboard grade), fine paper and tissue paper use different kinds of pulp in their furnish (mäld). In the case of solid bleached board and woodfree fine paper (i.e. fine paper with little or no mechanical pulp content) advantages of technical integration can be achieved, provided that paper production is large enough. If the fine paper or solid board is produced for export, some of the cost advantages of technical integration will be balanced by higher transport and marketing costs. In a study made by the international consultancy firm, Jaako Pöyry, it was estimated that a technically-integrated fine paper mill in Scandinavia exporting paper to the EEC market had a cost advantage of about 5 per cent compared with an unintegrated paper mill of the same size located near the market.<23>

The production of tissue paper is rarely technically-integrated with pulp production. Tissue is very expensive to transport by comparison with pulp. Production for export is therefore not advantageous. In the production of tissue different grades of pulp are also used. As a consequence technical integration with, especially, chemical pulp production can only be partial, whereby most of the economies of integration will not be reaped.

As an illustration of changes in the pattern of technical integration, woodfree fine paper provides an interesting case. Fine paper used to be an example of a paper grade that required special know-how in production and marketing. Individual customers had different specifications of tint, surface characteristics and porosity as well as basis weight (tyvikt) and sheet sizes.<24> The grade changes were frequent and the runs were short, which favoured the use of small unintegrated and versatile paper machines. There has, however, been a trend towards a more standardized range of products during the last twenty years. The use of new rotary presses has raised the demand for fine paper in reels. The paper for the data business is also delivered in reels. Facilities to cut reels down to sheets of standard format have been installed in the paper mills.

The technique of producing bleached short-fibre pulp from hardwood, developed in the 1950s, is an example of a technological change of importance for technical integration between pulp and fine paper production.<25> By use of bleached short-fibre pulp from hardwood in the pulp mix a fast-draining furnish was created that permitted higher speed on the paper machines.

The technical integration between woodfree fine paper and pulp has taken place almost entirely during the last 15 years. In 1970 there were hardly any examples of paper mills integrated with chemical pulp production.<26> In 1980 67 per cent of Scandinavian capacity and 17 per cent of the capacity in the rest of Western Europe was integrated.<27>

Energy savings. A remarkable increase of surplus energy can be noted for bleached sulphite pulp. The explanation for this is a change away from the use of calcium sulphite or bisulphite to the use of magnesium, sodium, or ammonium sulphite as boiling liquids in the pulp

production. In contrast to calcium sulphite and bisulphite, the waste liquor from the last three boiling bases can be recovered and the waste used as fuel.

Table 6.5 shows, for four paper grades produced in integrated mills, the share of total fuel consumption that was internally supplied in 1973 and 1979. With the exception of fine paper, these are products that are traditionally produced in integrated mills. For liner, fine paper and sackcraft it was possible in 1979 to supply more than fifty per cent of the total fuel consumption from internal sources (i.e. bark and waste liquor). Between 1973 and 1979 the savings in consumption of externally supplied fuel have increased for all the four types of paper. The savings have increased especially for fine paper.

Table 6.5 Share of Total Fuel Consumption Supplied by Internal Sources in Technically Integrated Paper Mills, 1973 and 1979.

Paper grades	Year	Total consumption of fuel (loe/ton)	Fuel supplied by internal sources (loe/ton)	Share of total fuel consumption supplied internally (%)
Newsprint	1973	311	85	27
	1979	256	78	30
Kraftliner	1973	449	326	63
	1979	387	260	68
Fine paper	1973	603	276	46
	1979	608	327	54
Sackcraft	1973	665	407	61
	1979	648	404	62

Source: Svenska Cellulosa och Pappersbruksföreningen, 1979, Energiförbrukningen i massa- och pappersindustrin 1979, Table 7.1.

Note: loe = litre oil equivalent

6.5.3 Effects of Trade Barriers

Technical integration has historically been influenced by the tariff barriers on Swedish paper exports to the EEC. These tariff barriers were totally abolished at the end of 1983. Pulp and, in practice also, newsprint have been duty free since the EFTA agreement with the EEC in 1972.<28> The objective of the tariffs was to protect the EEC paper industry, which is often less efficient than the Scandinavian and the North American paper industry (especially in the case of fine paper and folding boxboard).<29>

In addition to tariffs, quantity restrictions in the form of plafonds have been used in differing degrees. The system of plafonds was invented in connection with the agreement in 1972 between the EEC and the remaining EFTA-members on a successive reduction of tariffs to a zero-duty by the beginning of 1984.<30>

A plafond puts a ceiling on the quantity for which a lower tariff is applied according to the tariff reduction scheme of the 1972 agreement. If imports from Sweden exceeded the plafond, the EEC-country had the right to raise the tariff on the excessive quantity to a level corresponding to the EEC's ordinary exterior tariff wall to a third country (i.e. the tariffs that have to be paid by countries that are neither members of the EEC or EFTA). The exterior tariff amounted in 1982 to about 11 percent for paper grades other than kraftliner and newsprint.

This system of tariffs and plafonds meant that Swedish producers, in order to be able to compete with suppliers within the EEC, had to be efficient enough to compensate for the difference in cost caused by these trade restrictions. The number of plafonds was gradually reduced from 16 in 1972 to 8 in 1979 and zero in 1984.

Since about 70 per cent of Swedish paper exports is sold on the EEC-markets, the trade barriers have had an impact on the choice of export paper grades. Swedish export production has to a large extent been oriented towards bulk products where the cost advantages of technical integration are large enough to compensate for the EEC-tariffs (i.e. kraftliner, kraftpaper such as sackcraft and semi-chemical fluting).

The orientation towards newsprint is also supported by the fact that newsprint has in practice been duty-free.

Recently fine paper and certain folding boxboard grades have also started to become technically integrated with pulp production and exported to the EEC. The export share of total Swedish deliveries of fine paper has, for example, increased from 40 per cent in 1970 to 66 per cent in 1979. The successive reduction of the tariffs on fine paper is one of the explanations for this pattern of events.

The trade restrictions have been especially severe for the export of fine paper and folding boxboard. If a Swedish forest company that produces white pulp, i.e. bleached sulphate or sulphite pulp, wants to technically integrate, fine paper, paperboard or soft tissue are essentially the different paper grades to choose between (cf. Table 6.1).

In the case of tissue paper production, technical integration between pulp and paper is unrealistic as the tissue, because of, among other things its bulkiness, should be produced near the market. In the other two cases economies of technical integration exist. The economies of technical integration had, however, to be large enough to cover the costs of the tariffs.

6.5.4 Transactional Considerations<31>

Examples of market transactions. There is now common ownership of the pulp and paper stages in all technically-integrated mills in Sweden. The only Swedish example of a technically-integrated mill that was not at the same time vertically-integrated in terms of its ownership, is Nymölla during the period 1972 to 1975. At the same site as Nymölla sulphite pulp mill, owned by Nymölla AB, a technically integrated fine paper mill was built in 1972 by AB Papyrus.

As there was separate ownership of the two production stages, the technically-integrated paper mill had to buy the pulp at an agreed market price. Energy delivered in the form of electric power and steam from the pulp to the paper mill had to be valued and the costs of common maintenance and water systems to be divided.

The paper mill was taken over by Nymölla AB in 1975. At the time the integrated paper mill was built, AB Papyrus had a dominant minority interest in Nymölla AB of 49.7 per cent of the shares. AB Papyrus' major ownership of shares in Nymölla AB probably facilitated agreements on valuation rules and division of common costs in their contractual relationship. In spite of this, common ownership was the transactional arrangement finally chosen.

Other examples of markets between technically-integrated pulp and paper stages can be found in some of the companies with a divisionalized organization form. The pulp and paper stages are in these cases different divisions, each of which aims at profit maximization. There is vertical integration in the form of common ownership, but an internal market is created for the pulp transactions. For each ton of pulp, pumped over to the paper mill, the pulp division gets a revenue and the paper division a raw material cost equal to the agreed transfer price. The transfer price is usually to be the same as the "market" price.

The idea behind the divisionalized organization structure is that the controlling task of the management should be facilitated by having regular profit figures at its disposal for judgement of the performance of different parts of the firm (cf. Section 2.4). By using this information, resources can be more accurately allocated to activities with bright prospects.

Costs of market transactions. In a technically integrated unit there is, however, a restriction in the choice of trading partners (cf. Section 3.3). The savings from technical integration are dependant on continued internal pulp deliveries. The parties are in this way locked into a bilateral trading relationship.

In the case of a market between the two integrated stages, there are likely to be transactional problems in agreements on the pulp price, the quantity of fibres delivered to the paper mill, the price for the energy delivered from the pulp mill and the allocation of the common costs of process water, discharge of residues and maintenance. Even if a once-for-all contract is concluded that tries to regulate the bilateral trading relationship in detail, transactional problems are

likely to arise in at least some of these five cases. Let us first consider the problems of reaching an agreement on a price for the pumped pulp.

The technically-integrated pulp and paper stages are dependent on each other as customer and supplier. The lowest possible pulp price for continued integrated deliveries is market price minus unit costs for transport, storage and marketing of the pulp and an eventual cost for technical disintegration of the pulp mill (i.e. investment in a market pulp line). At the paper stage, the highest acceptable pulp price is equal to lowest obtainable price from an alternative supply source plus extra cost for transport, storage, handling and processing of the pulp and a possible cost for investment in pulp dissolver (massaupplösare). The range between these two price levels constitutes the appropriable quasi-rent (cf. Sections 2.3.4 and 3.3.2).

Even if the parties come to a contractual agreement about a price rule, such as setting price equal to the world market price, the transactional problems are not solved. There will still be uncertainty about exchange terms as the price levels differ for different countries and sometimes also for different buyers in a given country (see, e.g., Figure 6.4). The spread in prices is larger during recessions than during booms. The parties must therefore also come to an agreement on what markets and to what buyers the pulp would have been sold if it had not been delivered to the integrated paper mill.

There is also the technical problem of measuring the quantity of pulp pumped into the integrated paper mill. The difficulty lies in determining the concentration fibres in the wet pulp. To be able to pump the pulp, the fibre content must not exceed 4 per cent. A normal fibre content in the pulp pumped to the paper mill is around 2 per cent, the remaining 98 per cent is water. The concentration ratio fluctuates. If the ratio increases to 2.2 per cent, this means a 10 per cent increase in the quantity of pulp supplied per pumped liter. Both parties must come to an agreement of how to calibrate their instruments for measuring the concentration ratio.

Small-numbers exchange problems are also encountered in agreements on the prices of the energy that is delivered from the pulp mill to the paper mill in the form of electricity and steam. A pulp mill generates more energy than is needed internally from the burning of bark, logging waste and waste from recycled boiling liquor. The steam that is not needed internally will, in an unintegrated mill, be let out in the air, often after passing through a backpressure turbine for the production of electric power. For the steam that would otherwise be let out in the air, any positive price means a net profit. The lowest possible price is thus equal to zero. The highest possible price for the steam corresponds to the alternative cost for the paper mill of using oil for generating the steam necessary for drying the paper. These two extremes determine the appropriable rent of the integrated energy system to be divided among the two parties.

Part of the back pressure power generated in an integrated mill is delivered to the paper stage. How much of the energy content of the steam that will be converted to back pressure power and delivered in the form of electricity to the paper mill is dependent on the relationship between oil and electricity prices. If the oil price drops relative to the electricity price, more of the energy content of the steam will be delivered as electric power to the paper mill and vice versa. For the back pressure power the transfer price will be equal to the market price, since the alternative is to deliver to or to obtain supplies from the electricity network.

To sum up, in all technically-integrated mills in Sweden there is now common ownership. An earlier Swedish example of separate ownership was not long-lived. To keep down the costs of management control, some companies have tried a divisionalized organization structure with an internal market between technically-integrated pulp and paper stages. The bilateral trading position has in these cases resulted in difficulties in reaching agreements on the appropriate pumped pulp price. With a market between integrated stages, there are also likely to be problems of agreement concerning the transfer price for steam delivered internally as well as in the determination of the quantity of fibres delivered to the paper stage.

6.6 Sensitivity to Demand Variations

Technological interdependency is not the only cause of small- numbers exchange situations, which promote vertical integration. It is surely the most important cause, since more than half of Swedish pulp production consists of pumped pulp. But, as much as perhaps 10 per cent of the Swedish pulp production is captive pulp delivered to own paper mills that are integrated in terms of ownership but that are not technically integrated.<32>

A large part of this captive dried pulp is delivered to integrated papermills abroad. All this foreign integration of Swedish pulp and paper companies has taken place on the nearby West European markets and in all cases the integration has been with paper grades that use bleached chemical pulp as input (see Table 6.6).<33> These are paper grades for which proximity to the market is important (cf. Section 6.5.2).

Table 6.6 Swedish Forest Companies with Ownership Interests in Foreign Paper Industries, 1982.

Swedish company	Foreign paper industry
Svenska Cellulosa AB (SCA)	Fine paper (<u>PWA</u> , West Germany, minority interest, 11 percent)
	Soft tissue (<u>Mölnlycke Netherlands</u> and <u>Mölnlycke France</u> , majority interests)
Norrlands Skogs-ägare AB (Ncb)	Fine paper (<u>Hannover Papier</u> , West Germany, majority interest)
	Soft tissue (<u>Edet Netherlands</u> , majority interest)

Cont.

Table 6.1 - Continued.

AB Papyrus	Folding boxboard	(<u>UK Papyrus Ltd</u> , majority interest)
	Folding boxboard	(<u>Norrsundet Bruks AB</u> (bleached sulphate pulp) in Sweden is a joint venture between Papyrus and Feldmühle AG, which is the largest producer of folding boxboard in West Germany)
Mo och Domsjö AB (MoDo)	Fine paper	(<u>Papetrie de Ponte Sainte Maxence SA</u> , France, majority interest)
	Soft tissue	(<u>Mabelpap SA</u> , Belgium, majority interest)

Source: Annual Reports

Note: Majority ownership implies more than 50 percent of the voting shares.

The most important reason for this forward integration is probably that of avoiding costs of small-numbers exchange due to market power in nearby exchange (cf. discussion in Section 3.4).

6.6.1 High Quasi-Rents and Uncertainty

The pulp and the paper industries are extremely capital intensive. Real capital per working hour was, e.g., more than three times higher in 1974 for the pulp and paper industry than for the average in Swedish manufacturing industry.<34>

Capital intensity has also shown an increasing tendency during the last ten years. The investment costs for new sulphate pulp mills, e.g., have been increasing faster than the inflation rate in Sweden in the last decade.<35>

In 1980 the investment cost for a new bleached sulphate mill in Scandinavia with a capacity of 300,000 tonnes/year was estimated to 1,300-1,400 millions SEK.<36> The latest large pulp mill in Sweden, the Mönsterås mill of Södra Skogsägarna, cost 1,150 millions SEK to build. The project started in 1976 and the mill was ready for production in 1980. The Mönsterås mill has a capacity of 300,000

tonnes/year and produces bleached sulphate pulp.

Table 6.7 describes the cost structure of a Swedish pulp mill in 1976. Variable costs (including transport cost to the West European market) accounted for 62 per cent and fixed costs for 38 per cent of the total costs at full capacity utilization in a new bleached sulphate pulp mill. Given this information the operating rates corresponding to the break-even points can be calculated for different price levels.<37> At prices exceeding average total costs at full capacity utilization by 5, 10 and 20 per cent, the break-even point is reached at operating rates of 88, 79 and 65 per cent, respectively.

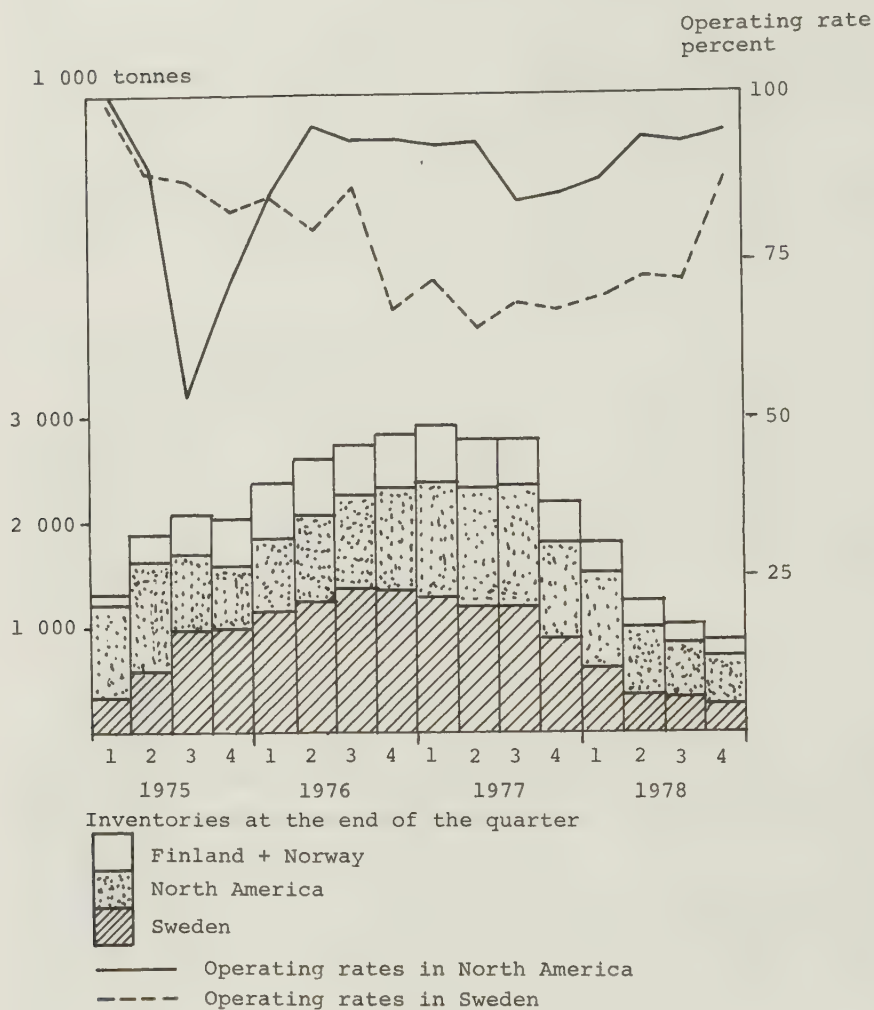
Table 6.7 The Cost Structure in 1976 of a New Swedish Bleached Sulphate Mill with a Capacity of 300,000 tonnes/year

	Variable costs (excl. trans- portation costs)	Capital costs	Wages and other fixed costs	Costs of trans- portation to Western Europe
Per cent of total costs	55	27	11	7

Source: Ds I 1979:5, p. 114

Figure 6.2 and Table 6.8 show a typical business cycle pattern for operating rates, changes in producers' inventory and prices. Swedish inventory changes during 1975 to 1976 were influenced by the governmental subsidies to stockpiling. Sales of pulp are made in US dollars. The pulp price in SEK is also sensitive, therefore, to changes in the exchange ratio of the US dollar.

Figure 6.2 Producers' Pulp Inventories and Operating Rates in Pulp Production, 1975-1978.



Source: Ds I 1979:5, p. 144 and SCPF statistics.

Table 6.8 CIF Prices per Tonne of Bleached Coniferous Sulphate Pulp on the West European Market.

Date	US dollars	Date	US dollars	Date	US dollars
1968:1	145	1974:1	(255)	1979:4	475
1968:2	147	1974:2	(340)	1980:1	500
1969:1	152	1974:3	(360-385)	1980:2	545
1969:2	159	1975:1	415	1981:2	545
1970:1	171	1977:1	(400)	1981:3	545
1970:2	179	1977:2	(360)	1981:4	545 (550)
1971:2	186	1978:1	(330)	1982:1	545 (580)
1972:2	186	1978:3	340	1982:2	545
1973:1	201	1978:4	380	1982:3	500-480
1973:2	212	1979:1	410	1982:4	440-420-400
1973:3	232	1979:2	435		

Source: Otto Silfverberg (Svenska Cellulosa- och Pappersbruks-föreningen, SCPF)

Notes: 1968:1 denotes 1st quarter 1968, 1968:2 2nd quarter 1968 etc.

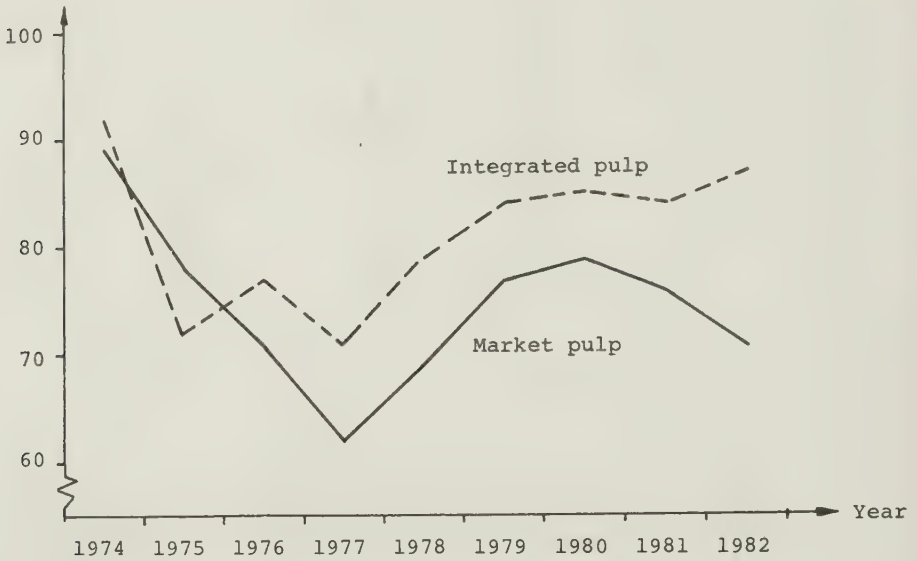
Parentheses denote uncertainty about the real price level. The uncertainty in 1974 prices is due to the fact that sales of Swedish pulp were made in SEK in that year. 1977-1978: prices were decreasing at a non-uniform rate in Swedish pulp sales.

In 1974 and 1982 more than one price was quoted.

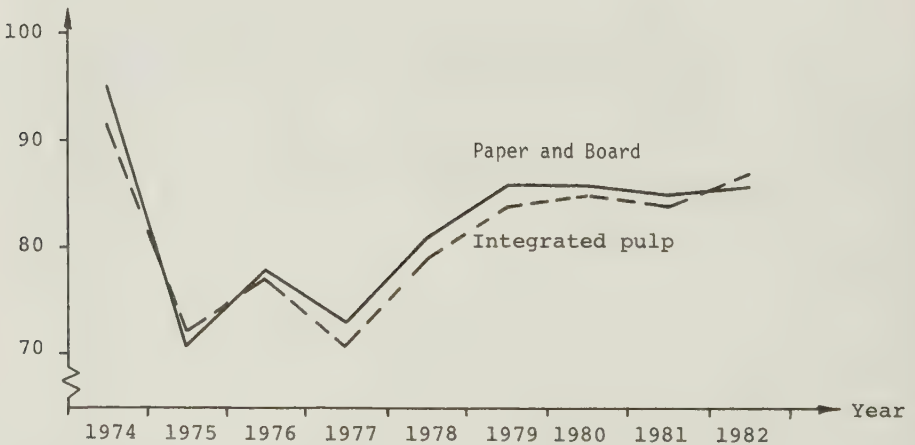
As a general observation, the cyclical fluctuations in demand tend to be larger the closer to the raw material source one gets.<38> A stable demand is likely to be reflected in stable operating rates. Figure 6.3 illustrates in this way a higher degree of stability of paper and board demand compared with market pulp demand.

Figure 6.3 Operating Rates for Swedish Production of Market Pulp, Integrated Pulp and Paper and Board.

Percent



Percent



Source: SCPF's Annual Reports 1978, pp. 16-19 and 1982, pp. 6-7.

One factor that can explain the larger fluctuations in the demand for pulp than for paper is pulp stock changes at the different stages. There is a negative relationship between pulp stocks held by producers and those held by consumers. While producers increase stocks at the beginning of a recession, the consumers (i.e. paper and board mills) behave in an almost opposite way. Their stocks are built up at the end of booms and reduced immediately before or at the beginning of a recession.<39> This inventory behaviour is generated by unexpected changes in the demand for paper, changes in delivery times and inventory speculation.<40>

Change of pulp supplier is another factor that causes fluctuations in the pulp demand for a forest company.<41> North American pulp producers contribute to temporary changes of suppliers on the West European market by shipping cheap pulp to Europe when demand is low at home.<42> As long as a contribution to fixed cost can be obtained from these marginal quantities, this geographical price discrimination can be a profitable policy. The delivered quantity can be increased without disturbing the domestic price level.<43>

6.6.2 Site Specificity

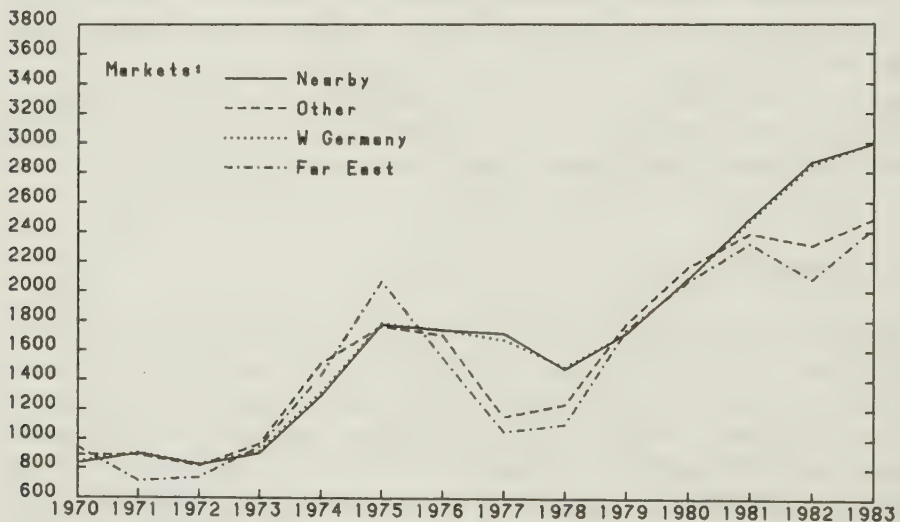
Unit gross profit is heavily dependent upon the geographical market to which the pulp is sold. Figure 6.4 illustrates how unit gross profit from the sale of bleached chemical pulp varies between foreign markets during different phases of business cycles. Sales on nearby markets, such as Western Europe, give a more stable and on average also higher unit contribution to fixed costs and profit. While the unit gross profits on nearby markets largely exceed those on overseas markets (i.e. non-European markets) during recessions (1971-72, 1976-78 and 1981-82), it is sometimes possible to earn higher profits from overseas sales during booms. This pattern is a result of the marginal character of many of the overseas markets to both Scandinavian and North American producers (cf. Section 3.4).

An important factor to consider here is that it is on the West European markets that the Scandinavian producers have a transportational advantage compared with their North American competitors. Higher unit gross profits on nearby markets can to a

large extent be explained by differences in transportation costs (cf. Section 3.4.1) The advantage of lower transportation costs to Western Europe has increased during the last fifteen years as a result of the rise in the price of bunker oil. For example, the difference in costs between a Swedish and Canadian mill for transport of bleached sulphate pulp to Rotterdam in the Netherlands increased from 24 US dollars per tonne in 1972 to 71 US dollars per tonne in 1980.<44> As the oil price is quoted in dollars this difference expressed in SEK has since then been further increased due to the continuing rise in the exchange rate for US dollars.

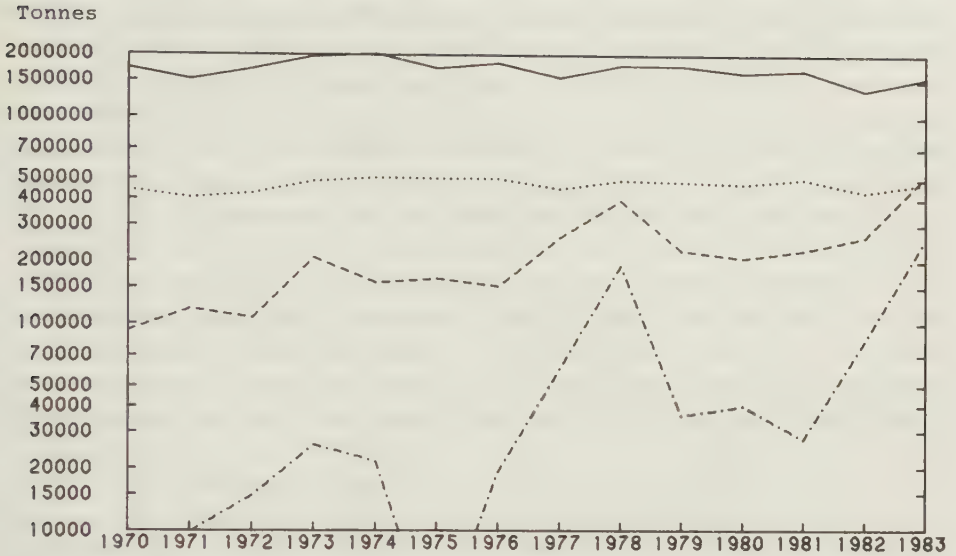
Figure 6.4 FOB Prices and Volumes for Swedish Exports of Bleached Sulphate Pulp, 1970-1983.

SEK/Tonne



Cont.

Figure 6.4 - Continued.



Source: SOS Utrikeshandel

Remark: Nearby markets = EEC (excl. Greece), EFTA and Spain.

The EEC market for bleached sulphate pulp can serve as an example of the small-numbers exchange situation faced by Swedish pulp producers on nearby markets. During 1979-1982 the annual EEC consumption of bleached sulphate pulp amounted to about 6.6 millions tonnes and importation to about 6.1 millions tonnes. The bleached pulp is sold by at least 50 pulp producers to more than 800 independent paper manufacturers, among which the largest purchase more than 200 tonnes per year.<45>

Some of the sellers have a market pulp capacity of bleached sulphate of considerable size compared to the EEC market. One of the largest sellers is Finncell, which is a joint sales organization that markets all Finnish pulp. The manufacturers that belong to Finncell have between them a market bleached sulphate pulp capacity of 1.6 millions tonnes per year.<46> Some Swedish pulp companies such as Södra Skogsägarna AB (Södra), Stora Kopparbergs Bergslags AB (Stora) and Mo

och Domsjö AB (MoDo) are also large compared to the size of the EEC-market. Södra has a market pulp capacity of bleached sulphate of 950,000 tonnes per year, Stora some 400,000 tonnes per year and MoDo more than 300,000 tonnes per year.<47> In total Finncell, Södra, Stora and MoDo thus represent a market pulp capacity larger than half the EEC importation. If all other Swedish market pulp producers are also included, total capacity corresponds to more than two thirds of EEC importation. This is to be compared with the actual share of 33 per cent of the Finnish and Swedish producers in 1982.<48>

These figures illustrate the ability to influence the EEC price level through quantity adjustments. The EEC market for bleached sulphate pulp can in this perspective be characterized as oligopolistic. Furthermore, rapid reactions by rivals to price changes also contribute in making a firm's demand inelastic on the EEC market.<49>

Due to the low short-run price elasticity, small-numbers exchange situations are likely to arise during recessions when it is not possible, at prevailing prices, to fill up the pulp capacity with orders from the nearby markets where quasi-rents are higher. Price wars are to be avoided as the increase in total demand quantity would be small and gross profit reduced for all pulp companies. An increase in sales on overseas markets is likely during a recession to be a more profitable strategy of keeping up operating rates (cf. Section 3.4.2). In Figure 6.4 this pattern is shown by the increases in the quantities sold on the markets denoted "Other" and "Far East" during recessions.

6.6.3 Transactional Analysis

The high fixed costs and the small-numbers exchange situations faced by pulp producers during recessions (paper producers during booms) in nearby markets indicate a need to assure demand (supply). Transactional alternatives in these cases are long-term contracts and vertical integration.

Reservation contracts represent for a pulp producing company the most common way to try to avoid unexpected demand decreases by long-term contracts. To have a base quantity reserved through reservation contracts is to the advantage of both seller and buyer. In a

recession, an unexpected decrease in pulp orders from a nearby market will often be best compensated by increased sales in overseas markets. During a boom, the spot prices for urgent deliveries can sometimes be much higher than those paid in a reservation contract. An unexpected shortage of pulp can then be very expensive for a paper mill.

The reservation contract has, primarily, the character of a planning instrument. The pulp producer with his or her knowledge of free pulp capacity and the consumer his or her knowledge of probable future consumption can offer each other a more or less assured supply/demand of pulp. The operating rates in the pulp and paper mills can thereby be increased and made more stable.

In a reservation contract quantities and delivery times are specified for a certain time ahead (mostly a year) (cf. Section 6.4). There is also, especially during booms (cf. Table 6.8), a stable price valid for at least a quarter. Price increases are to be announced at least a month in advance of a new quarter. Long-term contracts with a specified pulp price, valid for longer time periods than a quarter, are almost nonexistent on the pulp market.<50>

To foresee the future pulp requirements for smooth paper production in such an uncertain exchange environment as the pulp trade represents one difficulty with this transactional arrangement. For such an arrangement to function it is important that the parties feel that they can trust each other and that the agreements will be honoured. Overbooking of pulp capacity and temporary shifts of suppliers during recessions make this contractual agreement ineffective. The agreement cannot stop a customer from changing supplier whenever it is deemed desirable. The enforcement of reservation contracts is in practice accomplished on an informal basis (see Section 6.4). Legal steps are very rare. As the price is fixed for only a quarter at a time, there are still motives for inventory speculation that can have a destabilizing effect on pulp demand.

There exists a small-numbers exchange problem when these reservation contracts are not honoured or the stability in these usually long-term contractual relationships is broken. The problem consists in a lack of equally profitable sales alternatives in the short run. During a recession, it is the pulp producer that runs into problems. A loss of

expected reservation orders will result in a loss of gross profit from increased inventories, price cuts or compensating sales on distant markets. Through renegotiation of the price in the form of secret rebates a part of the pulp producer's quasi-rent can be appropriated. (The prevalence of rebates during recessions is indicated in Table 6.8 by parentheses around prices in 1977-78 and more than one price in 1982).

The choice of ownership instead of a contractual alternative such as a reservation contract can be explained by certain control, planning and incentive advantages of vertical integration.

When unexpected decreases in demand (supply) occur, an employed paper mill (pulp mill) manager can simply be ordered to use (deliver) more internal pulp during recessions (booms). High and stable operating rates in integrated pulp mills can be achieved with less losses in unit gross profits from sales on distant markets and rebates during recessions. Integrated paper mills can keep full capacity utilization during booms with a smaller number of expensive spot market purchases of pulp caused by unexpected breaches of agreements in concluded reservation contracts.

Furthermore, an employed paper manager can be ordered not to build up too large pulp stocks during booms. It is thereby possible to avoid sharp drops in pulp demand due to excessive pulp inventories at the paper stage at the end of booms. The results are more stable operating rates and reduced inventory costs.

In addition the incentives for destabilizing inventory speculation in future changes in pulp prices can be avoided for internal supplies, as it is the joint profit of both the integrated stages that counts. A divisional manager who behaves opportunistically in this respect is, when discovered, not likely to be rewarded.

The advantages of vertical integration compared with contracts as a means of achieving high and stable operating rates are indicated by the dotted lines in Figure 6.3. In the lower diagram the coincidence between operating rates in paper mills and integrated pulp mills illustrates how demand fluctuations specific to the pulp stage can be dampened by vertical integration.

It is to be noticed here that demand variations due to pulp inventory changes and shifts of supplier, are to a certain extent for pure technological reasons, avoided in technically-integrated mills. As most of the forward integration is of this technical nature (around 90 per cent of the domestic integration in 1979), this is an important explanation for the high and more stable operating rates in integrated pulp production shown in Figure 6.3.

Among the different pulp grades, capital intensity is highest for bleached chemical pulp. Bleached chemical pulp has also more of a market pulp character than other pulp grades. The advantage of vertical integration as a means of avoiding the costs of small-numbers exchange due to demand variations is therefore likely to be accentuated for this pulp grade. A confirmation of this reasoning is that in all foreign integration bleached chemical pulp is the grade that has been integrated with paper production on nearby markets (cf. Table 6.6 that shows the integration with fine paper, folding boxboard and tissue, which are all paper grades that use bleached chemical pulp as raw material).

To sum up, the statistics show higher and more stable operating rates for forward-integrated than unintegrated pulp production. Most of the higher and more stable operating rates of integrated pulp can probably be explained by technical integration, that by definition excludes supplier shifts and pulp inventory induced demand variations. Integration with paper and board production abroad is concentrated on bleached chemical pulp, which has a higher capital intensity than other pulp grades. The advantages of integration that is only financial (i.e. not technical) are, in particular, the ability to alleviate incentives for inventory speculation and to influence the internal use of pulp.

By and large, however, transaction by contract seems to function rather well for Swedish pulp exports to Western Europe. It is only a smaller proportion of perhaps 10 per cent of exports that is captive pulp.

6.7 Summary

About 60 per cent of Swedish pulp production is used in domestically-integrated paper mills. At the international level this is not an especially high degree of forward integration. Sweden's main competitors on the world market, Finland, Canada and the USA, all show higher degrees of forward integration. Swedish backward integration with pulp is about 90 per cent. About 90 per cent of the Swedish pulp, not delivered to domestically-integrated paper mills, is exported. Among the different pulp grades, bleached sulphate pulp is most characterized by market sales.

Market pulp is sold either on short-term contracts, type spot sales, or long-term contracts of a type denominated "reservation" contract (cf. Table 4.2). A reservation contract is a quantity agreement in which a pulp producer reserves a quantity of X tonnes for a customer, to be successively delivered during a time-period of usually one year. Reservation contracts are mainly used in sales on nearby markets, where continuity in relationships is important, as within the EEC-area. Spot sales are the common way of doing business on "overseas" markets as, e.g., those of the Far East.

Among the causes of small-numbers exchange, economies of technical integration are the most important (cf. Table 4.1). In 1979 52 per cent of Swedish pulp production was technically integrated with paper production. By technical integration, savings in capital, labour and energy can be achieved.

The paper grades most suitable for technical integration are those which (1) are standardized, (2) are produced from a few different pulp qualities, (3) have substantial economies of scale, (4) are relatively cheap to transport and (5) where strength and stiffness are desirable properties. Paper grades that traditionally have met these criteria are sackcraft, kraftliner, semi-chemical fluting and newsprint. In studies from the beginning of the 1970s, the savings due to technical integration have been estimated at 12 to 15 per cent of the total costs for paper grades such as newsprint and sackcraft. Owing to both technical and marketing innovations and the successive abolition of trade barriers, it has recently been possible to reap substantial

economies of technical integration in the production of fine paper.

Between technically-integrated mills a small-numbers exchange situation emerges, where economies of production and transportation determine the size of the bargaining region. If there is a market, transactional problems in the division of quasi-rents arise. There are likely to be high transaction costs of reaching and enforcing agreements on the appropriate pumped pulp price, the transfer price for steam delivered internally as well as the delivered quantity of pulp fibres. With vertical integration these transaction costs can be alleviated as there are no pre-emptive profit claims. An earlier example of separate ownership of technically-integrated mills was not long-lived. There was, by 1984, common ownership of both the production stages in all technically-integrated Swedish mills.

The high capital-intensity of chemical pulp mills in particular makes profits sensitive to variations in operating rates, pulp inventories and unit gross profits. It is therefore important to avoid small-numbers exchange situations due to variations in pulp demand on, especially, nearby markets. The advantages of vertical integration compared with transactions by contracts are the increased enforcement capabilities and the higher degree of flexibility in the use of resources. Indications of these advantages are the concentration of the foreign integration of Swedish pulp and paper companies on nearby markets and on paper grades that use bleached chemical pulp as raw material, and to a certain degree also the higher operating rates for integrated pulp production.

Notes

1. See, e.g., Papper och pappersmassa - en grundbok (1976) pp. 30-50 and 110-112.
2. See Official Journal of the European Communities, March 1985, p. 2.
3. Captive pulp is an expression for pulp that is delivered to integrated paper mills. Pulp sold to independent paper mills is denoted market pulp.
4. See SCPF (1979) p. 54.

5. See Pulp and Paper in Sweden, 1980 and 1982.
6. See FAO Yearbook 1979.
7. See The Pulp and Paper Industry 1979 ,Table 1.
8. See The Pulp and Paper Industry 1979, Table 1.
9. This section is based on interviews with Håkan Falck (ASSI), Torkil Högberg (Nymölla), Claes Hammarström (Södra Skogsägarna), Jörgen Strömberg (Iggesund) and Björn Allguren (Billerud). See also Kinch (1974).
10. During the 1970s and 1980s Swedish pulp export sales have been made in US dollars, with 1974 as the only exception. In 1974 pulp export sales were in Swedish crowns. After a request by the Commission of the European Economic Community the Swedish companies have recently agreed to quote and invoice at least half of all sales after March 31 1985 to EEC customers in the currency of the buyer and the rest in either Swedish kronor or any EEC currency (see Official Journal, March 26, 1985, p. 4 and Annex)
11. There is one Swedish example of an unbleached sulphite mill which in 1974 concluded a three years fixed price contract for sale of its whole pulp production. Immediately after the contract was concluded, the price of unbleached sulphite pulp started to fall and kept falling to the end of the contract period. The losses the buyers made on the long-term contract were heavy. In 1977 the contract was not renewed and the sulphite mill was shut down (source: interview).
12. See Klint (1980, p. 23).
13. See Klint (1980, pp. 23-27).
14. See Eklund (1972) and Berard (1977).
15. See OECD (1982, pp. 32 and 39).
16. See Pöyry (1980).
17. See OECD (1982, p. 35).
18. See Berard (1977, pp. 117-118).
19. See Eklund (1972, pp. 5-6).
20. It is now also possible to replace the chemical pulp as furnish with chemical thermomechanical pulp (CTMP).
21. See Berard (1977, p. 125) and Eklund (1972).
22. See Energiförbrukningen i massa- och pappersindustrin 1979, Tables 1-14.
23. See Ryti (1980, p. 11).
24. Ibid. p. 8.

25. Ibid.

26. See Löf (1979, p. 225).

27. See Ryti (1980).

28. See SCPF Annual Report (1978, p. 8) and Svensk skogsindustri i omvandling (1970, pp. 369-373).

29. See Ryti (1980).

30. See Ds I 1979:5, pp. 84-94.

31. This section is based on interviews with Bengt Hylander (ASSI), Bernt Löf (MoDo) and Torkil Högberg (Nymölla).

32. The vertical integration with technically-separated paper mills at home and abroad is very difficult to estimate. There are no official statistics. On the basis of figures in annual reports for 1982 and information for some companies, the pulp deliveries to integrated paper mills abroad could be estimated at between 2 and 5 per cent of Swedish pulp production. The domestic integration of dried pulp can in turn, from 1979 figures of technical integration and forward integration with domestic pulp production (SCPF statistics), be estimated at about 5 per cent of Swedish pulp production.

33. Stora Kopparberg's recent acquisition (in 1984) of a fine paper mill in the USA, Newton Fall's Paper Mill, offers an opportunity to achieve a more secure demand for the pulp produced at the nearby subsidiary in Canada, Nova Scotia Forest Industries. This acquisition is thus consistent with the view of foreign forward integration as a means, primarily, of securing the demand from the nearby markets where the quasi-rents are highest.

34. See IUI Långtidsbedömning, 1976, p. 183.

35. See Gundesby and Setälä (1983, p 18).

36. See Pöyry (1980, pp. 11-12).

37. The operating rates corresponding to the break-even points can be calculated from the figures in Table 5.8 as

Break-even quantity $Q = FC / (P - AVC) = 0.38 \times 300,000 \times ATC / (P - 0.62) \times ATC = 0.38 \times 300,000 / (P - 0.62)$ (see eq. 3.1 in note 16 in Chapter 2)

Break-even operating rate = break-even quantity/capacity

where capacity = 300.000 tonnes/year in this example

Prices exceeding total costs by 5, 10 and 20 per cent imply $P = 1.05$, $P = 1.10$ and $P = 1.20$ in the expression above.

38. See, e.g., Praski (1978, pp. 172-173).

39. See, e.g., Praski (1978, p. 178).

40. At the beginning of a boom delivery times can be increased. The demand for pulp rises and the pulp mills are no longer able to make deliveries from stock at the same extent as before. Instead they have to step up the production rate and the delivery times will become longer as full capacity utilization is approached. When the delivery times are prolonged and expected to be even longer and the demand for paper is increasing, the paper mills have to increase their transit inventories of pulp (transit inventories are needed for smooth production).

After a time the rate of increase in demand for paper slows down. The paper mills now find themselves in possession of such large pulp inventories that it will not be necessary to place any new orders for a certain time ahead and when these new orders are placed they are much smaller than before (see, e.g., Pulp and Paper International, October 1980, p. 140). The pulp mills then suddenly realize that the orders are not coming in at the same rate as before. Since it takes time before the production rate is reduced, inventories at the pulp mills start piling up.

The result is a cumulative process, that can be described by an accelerator model (see, e.g., Dornbusch and Fischer, 1981, p. 206). At the start of a boom the increasing inventories at the paper mills give rise to an accelerating increase in pulp demand. This demand increase will then gradually level off and turn into accelerating decreases when the paper mills discover that their pulp stocks are too large. Later on the decreases in pulp demand will slow down until the bottom of the recession is reached, etc.

There is also an important speculative motive for building up inventories at the beginning of a boom (see, e.g., Nellbeck, 1975, pp. 71-74 and Praski, 1978, p. 178). When business starts booming, paper mills start to place large orders simply to obtain a little more pulp before prices have increased too much. At the end of the boom when price increases are not so frequent, the paper mills stop buying for speculative purposes. The effect of this speculative stock-piling is then often that the paper mill will find itself in possession of an even larger surplus pulp stock when the paper demand levies off. Speculative stockpiling of this kind tends to make the cyclical pattern more pronounced.

41. On demand variations caused by shifts of supplier see Bernhardt (1978) and on the high interchangeability of pulp suppliers see paragraph 4 in Official Journal, 21 March 1985, p. 2.

42. See Pulp and Paper International, 1981, p. 134 and paragraphs 10 and 91 on pp. 3, 17 and 18 in Official Journal, 21 March 1985.

43. There is price discrimination in the sense that prices do not increase in proportion to longer transportation distances. The prices can instead sometimes be lower on distant markets. With differing elasticities on different geographical markets such a policy of price discrimination can be profitable (cf., e.g., Scherer, 1970, pp. 262-272 and the discussion in Section 3.4.1).

44. See Brändström (1981, p. 14). In 1982 the transportation costs (CIF) of bleached coniferous sulphate pulp to Rotterdam for mills located in Sweden (Sundsvall), US South and Canada (British Columbia) were 37, 94 and 111 US dollars per tonne respectively (Source:SCA).

45. See pp. 2-3 and Table 2 in Official Journal, 21 March 1985.
46. See FAO (1983), Pulp and Paper Capacities.
47. See Annual Reports and Bruzewitz, Nordisk Papperskalender, 1979-1983. A number of the Canadian and US companies, which mainly operate on the North American market, have even larger market pulp capacities than these Swedish companies (see, e.g., PPI Top in the September issues 1979-1983 and Directory of worldmarket producers in PPI July issues 1979-1983).
48. See Table 2 in Official Journal, 21 March 1985.
49. On rapid price reactions on the EEC market for bleached sulphate pulp see Official Journal, 21 March 1985.
51. Price fluctuations make such a contract infeasible (cf. note 11).

7 FORWARD INTEGRATION - WRAPPING AND PACKAGING PAPER AND BOARD

7.1 Introduction

In Chapters 7 and 8, the organization of transactions between the paper and paper conversion stages is studied. The purpose is to analyze why forward integration is chosen for some paper grades and transaction by contracts for others.

The paper sector is here divided into six different product groups; (1) liner and fluting, (2) sackcraft, (3) folding boxboard (4) newsprint and magazine paper, (5) fine paper and (6) tissue paper. The quantitative importance of the different groups in Sweden in 1984 is shown in Table 7.1. Each product group is treated separately with respect to characteristics, integration pattern and transactional analysis. The subsectors, characteristics, and integration pattern serve as background to the transactional analysis.

Table 7.1 Swedish Production of Paper and Board in 1984.

Grades	1,000 tonnes
Newsprint	1,507
Magazine paper	523
Kraftpaper (mainly sackcraft)	1,007
Kraftliner	1,209
Paperboard (mainly folding boxboard)	1,179
Fine paper	811
Tissue paper	255
Other grades (mainly fluting)	378
Total paper and board	6,869

Source: Svenska Cellulosa- och Pappersbruksföreningen (SCPF), Annual Report 1984, p. 7.

This chapter considers wrapping and packaging paper and board (groups 1, 2 and 3 above). With some exceptions, such as white top liner and certain folding boxboard qualities, only unbleached pulp is used as fibre material. These paper grades are therefore often denominated the

"brown" sector.

The "brown" sector is characterized by a high degree of technical integration. Grades such as kraftliner, semi-chemical fluting and sackcraft are, in Sweden, 100 per cent technically-integrated with chemical pulp production. Technical integration makes these products capital-intensive and thus the profit and the quasi-rent sensitive to variations in operating rates and unit gross profit (cf. Section 3.4).

This chapter is organized into three sections, 7.2, 7.3 and 7.4; which in turn consider liner and fluting, sackcraft and folding boxboard. Section 7.5 summarizes the chapter and offers concluding remarks.

7.2 Liner and Fluting

7.2.1 Characteristics

Products. Corrugated paperboard (wellpapp) is a packaging material which consists of sized plane and corrugated layers. Linerboard is used for the plane layers. The liner board is characterized by a high strength, especially if kraftliner is used. To the corrugated medium, where stiffness is the most desirable property, fluting paper is used

There are, in principle, two kinds of linerboard and fluting paper: (a) those made of mainly virgin fibres and (b) those with a large content of recycled fibres. Kraftliner is made of at least 80 per cent sulphate pulp.⁽¹⁾ Other liner such as testliner and schrenz has a much higher blend of other raw material with less strength. To a large extent waste paper is used in the production of testliner and shrenz. The two types of fluting are: (a) semi-chemical fluting (made from semi-chemical pulp based on hardwood) and (b) fluting that is primarily made from waste paper.

Swedish Producers. There was no significant Swedish production of corrugated case material before the 1960s. At the end of the 1950s and in the 1960s a number of kraftliner and semi-chemical fluting plants were built. SCA started in 1959 to build a kraftliner mill at Munksund, followed by ASSI which had a kraftliner mill built at

Lövholmen (Piteå) in 1962. The third big kraftliner mill at Obbola, which is jointly owned by SCA and St Regis (USA), was built in 1973-1975. Billerud started its production of semi-chemical fluting at Gruvön in 1968. The other big Swedish producer of semi-chemical fluting, Fiskeby, started production at Skärblacka in 1963.

Standardization. Semi-chemical fluting and kraftliner are standardized commodities. There are only differences between the two grades with regard to basis weights and dimensions. Among the different paper and board qualities, newsprint, kraftliner and semi-chemical fluting are the most standardized and are in this respect similar to pulp.<2> The standardized nature of liner and fluting makes it possible for the mills to manufacture for stock.

While kraftliner and semi-chemical fluting are standardized commodities sold on the world market, the output of the next stage, i.e. corrugated board, is tailored to the specific demands of local markets. Customers in the local market have special demands on appearance, print, size, wet strength etc of the boxes. Corrugated boxes are also bulky products that are expensive to transport over a long distance. A box maker will not be competitive if he tries to sell to end-users located more than 250-300 kilometres away from the plant.<3>

Trade and competition. Kraftliner and semi-chemical fluting are the two grades that are internationally traded. The major exporters of kraftliner to Western Europe are Sweden, USA, Canada, Finland and Portugal. The Swedish share of the EEC kraftliner market was almost 40 per cent in 1979. Major exporters of semi-chemical fluting to the West European market are Sweden and Finland.

In addition to the degree of standardization, kraftliner resembles pulp in the respect that the sales are made in US dollars and that North American companies tend to increase their sales in Europe during recessions at home.<4>

Kraftliner capacity in the USA amounts to about 16 million tonnes. During normal periods of supply and demand, more than 80 per cent of US kraftliner capacity is integrated with domestic box plants.<5> When the domestic demand for boxes decreases, the integrated firms try to

keep up operating rates by spot sales to Europe.<6> With a total net import of about 1.9 million tonnes in Western Europe, it is obvious that an increase in US exports amounting to only a tiny fraction of the total capacity has a large impact on a market that accounts for 85 per cent of Swedish kraftliner exports.<7>

The North American export of cheap kraftliner during recessions at home influences in an indirect way also the Scandinavian exports of semi-chemical fluting. The capacity for production of waste paper based liner (testliner) has increased considerably on the West European continent and in the UK in the 1970s. When cheap imports from North America press down the kraftliner prices, some of these West European mills switch from testliner to waste fluting production, which depresses the market for semi-chemical fluting.<8>

Contracts. The most common types of long-term contracts are, as in pulp sales, reservation contracts, where the seller reserves a certain quantity to be delivered during one year. The prices are to be determined quarterly.<9> The reservation contracts can be oral as well as more formally written. Price changes are announced at least 30 days in advance. <10> Long-term contracts running over longer time periods (1-5 years) do exist also. These contracts are more formal and legally binding.<11> In overseas sales spot contracts are more frequently used than in sales to Western Europe.

Inventories. There can be rather substantial inventories of liner/fluting at the mills and at the box plants. There are also inventories of boxes held at the box plants and by the end-users. Furthermore, the packaged good is stocked with the end-user and its customers, who can be wholesalers selling to retailers. Thus inventories are important

Technical integration. All Swedish kraftliner and semi-chemical fluting mills are technically integrated with chemical pulp production. The break-even point is consequently high in these capital-intensive mills.<12> The corrugated board industry is much less capital-intensive and therefore has a break-even point that tends to be considerably lower.<13>

7.2.2 Integration Pattern

Foreign investment on the European continent and in the UK in corrugated box making plants started at the end of the 1950s and accelerated during the 1960s.<14> The first investments were made by US firms. Container Corporation and International Paper started in 1959 with corrugated board production in West Germany and Italy. Their initiative was followed by others and in 1970 US and Canadian companies had direct ownership interests in 18 European corrugated board firms.

There are many explanations of the sudden American interest in Europe as a captive market for corrugated case materials. Firstly, there had been large increases in the US capacity for kraftliner and semi-chemical production during the 1950s. These capacity increases were followed by a recession in the US market at the end of the 1950s with overcapacity as a result.

Secondly, kraftliner, semi-chemical fluting and corrugated board are products that have been developed in the USA. These products were in 1950s produced only on a small scale in Western Europe. In 1957 the EEC (the "Common Market") was founded. Given a European common market with trade of a character equal to that between the states in USA, the companies saw an opportunity to exploit their knowledge of corrugated boxes as transport packing. By promoting the use of corrugated boxes, it would also be possible to increase the export of corrugated case materials like kraftliner. Integration by ownership was the usual way to organize case material transactions in the US market.

Thirdly, there was also a high annual growth in the European consumption of corrugated boxes during the 1950s. In the 1960s and the 1970s this growth rate steadily declined. From an average growth rate of 15 per cent in the 1950s, the rate decreased to 10 per cent in the 1960s and 5 per cent in the 1970s.<15>

US interests in the UK and Continental Europe as a market for sales of kraftliner and corrugated boxes were thus increasing during the 1960s. By 1971 its share of the kraftliner market had increased to 70 per cent. During the 1970s this share declined and in 1978 it was only 18

per cent. Today the Nordic producers are the largest suppliers of kraftliner.<16> The decline in the US share of the European market has coincided with a rise in the US domestic demand relative to liner capacity.<17> This pattern illustrates the role of Europe as a surplus market for US kraftliner producers.

Almost at the same time as the Swedish forest companies moved into the production of corrugated case material at the end of the 1950s and in the 1960s, they also started to acquire box plants at home, on the European continent and in the UK (see Table 7.2). ASSI has concentrated most of its expansion into the converting stage on the domestic market, while SCA and, especially, Billerud have integrated abroad.

Table 7.2 Swedish Producers of Liner/Fluting with Forward Integration into Box Making.

Company	Year of Acquisition	Acquired Company	Capacity tonnes/year
SCA	1961	Papelera Navarra SA, Spain (sold in 1970)	SCA's total box making capacity in 1983 was 750,000
	1963	Colon Embalage A/S, Denmark (50%)	
	1964	Papeteries Léon Clergau SA, France	
	1966	AB Värnamo Wellpappfabrik, Sweden	
	1967	Société Cartonages, France	
	1970	The Järfälla plant in Sweden was built	
	1974	Zewawell AG & Co, West Germany (earlier part of PWA) (50%)	
	1978	Jefferson Smurfit Group, UK and Ireland (48%)	
	1983	UK Corrugated, UK (24.5%) (merger between Smurfit UK and the Canadian company Mac Millan Bloedels boxplants in UK)	
	1984	Skarwell, Sweden (acquired from Fiskeby)	

Cont.

Table 7.2 - Continued.

ASSI	1967	Förenade Well, Sweden	88,900 (1979)
	1975	Emballage A/S, Denmark	10,000 (1979)
	1976	Dansk Kraftemballage A/S, Denmark	40,000 (1979)
	1977	Dolan Packaging Ltd, UK	77,000 (1979)
	1980	Gerro Karton, W Germany	n.a.
	1983	Empee Golfkarton BV, Holland	n.a.
Billerud	1966	Schelling Interwell, GmbH, Austria	30,000 (1977)
	1967	Unipak SAL, Libanon (50%, joint venture with Mead Corp, US) (sold in 1975)	-
	1967	Europapel SA, Spain (minority interest, joint venture with Mead) (sold in 1974)	-
	1967	Altonaer Wellpappen Fabrik, W Germany (50%, joint venture with Mead)	90,000 (1974)
	1968	Graficarton SA, Spain (minority interest, joint venture with Mead) (sold in 1974)	-
	1968	Cartonnerie Ménigault, France (later called Billerud Emballage)	70,000 (1978)
	1969	Schelling Emballage SA and E H Schelling AG, Schweiz, (sold 1977)	-
	1969	AB Svenska Wellpappfabriken, Sweden (sold to Esselte in 1975, long-term contract con- cluded at the time of the sale)	-
	1982	Sold 74,6% of the shares in Billerud Emballage (France), long-term contract concluded at the time of the sale.	
Fiskeby	1969	Robert Skarstedt AB, Sweden (sold to SCA in 1984)	-

Sources: SOU 1981:43, SCA Årsbok 1979, Forsgren and Kinch (1971, pp. 223-226), Skogstatistisk årsbok 1974 and 1975 and Annual Reports.

When the big kraftliner mill at Obbola was built in 1973-75, the desire for forward integration into the conversion stage was one of the reasons why SCA chose to undertake the project as a joint venture (on a 50/50-basis) with the US forest company St Regis. St Regis had substantial interests in the corrugated box industry in Denmark, the UK and France and wanted, because of the rising kraftliner demand in USA, to be able to supply these plants with liner produced in Europe. By having St Regis as a partner, it was possible for SCA to introduce an additional volume of 300,000 tonnes/year of kraftliner on the European market without larger price cuts.<18>

The degree of forward integration for the big producers of kraftliner in Sweden, SCA and ASSI, was in 1978 estimated at 35 and 20 per cent respectively.<19> Compared with the US producers, these are low figures. Most of the US forward integration is, however, domestic. 85 per cent of the kraftliner consumption in the USA stems from integrated box makers.<20>

As only 12 per cent of production is exported, the 80 per cent forward integration in USA is explained by a very high degree of domestic integration. The Swedish kraftliner producers export most of their production. In 1981 about 80 per cent of total Swedish kraftliner production was exported. If domestic supplies of kraftliner only were considered, higher figures for forward integration would be registered, since most of the corrugated board firms in Sweden are subsidiaries of Swedish forest companies. An exception is Esseltewell with a market share of 28 per cent.<21>

Vertical integration has been successively increasing since the 1960s.<22> Forward integration has been concentrated foremost on nearby markets and has been larger for kraftliner than semi-chemical fluting. In 1976 it was estimated that in important Swedish export countries such as the UK, West Germany, Denmark and France, 74, 77, 87 and 90 per cent respectively of total capacity for corrugated board production were integrated with virgin- or waste-based liner or fluting production.<23>

7.2.3 Transactional Analysis

Because of the higher seller concentration and product standardization the nearby European markets are more of an homogeneous oligopoly character for kaftliner and semi-chemical fluting than, e.g., for bleached chemical pulp.<24> Capital intensity in the technically integrated mills is high and the aggregate demand elasticity is low.<25>

Uncertainty. The market for corrugated raw material shows large cyclical variations, much larger than in the subsequent conversion stage. These larger variations are a result of changes in liner/fluting inventories and supplier shifts, that are facilitated by the standardized nature of the products. The North Americans are contributing to the supplier shifts by selling low-priced kraftliner in Europe during recessions at home.<26> For the US dollar- priced kraftliner there is also uncertainty in the form of currency rate changes.

Inventory changes can influence the demand for corrugated case material very strongly. As much as 12 per cent of the 18 per cent reduction in demand for corrugated case material in West Germany and France in 1974-75 could be attributed to reduced inventories at the box plants.<27>

In the Swedish pulp and paper industry changes in demand during a business cycle are large for many products. The sensitivity to cyclical fluctuations is especially pronounced for pulp, kraftliner and semi-chemical fluting. During booms there is a sellers' market in the sense of a high demand compared to capacity for production. Even at high prices, quantities corresponding to full capacity utilization can be sold. During recessions the opposite situation prevails. The sellers have difficulties in keeping high operating rates without large inventory increases, even if prices are low compared to those paid during a boom (for an example of price changes see Figure 7.1).

Figure 7.1 Prices for Swedish Kraftliner in West Germany, 1971-1978.



Source: Klint (1979, p. 60).

Site specificity. Another feature of the Swedish producers' demand situation is that the unit gross profit varies between different geographical markets (see Figure 7.2). The contributions from sales on nearby European markets tend, especially during recessions, to be higher than on overseas markets.

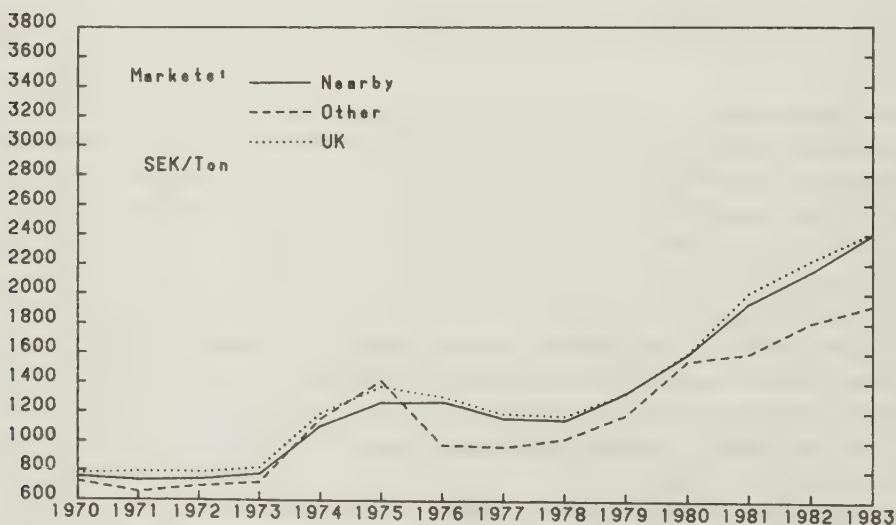
Low aggregate demand elasticity and quick responses to revealed price cuts make it costly to achieve larger quantity increases on the West European market by a price cutting strategy. The small number of large Swedish producers with substantial shares of the West European markets is another factor which contributes in making the demand faced by the firm on nearby markets inelastic. For example, in 1979 the Swedish share of the EEC kraftliner market was almost 40 per cent and there were only two large Swedish kraftliner producers, SCA and ASSI.

Due to differing demand elasticities it is, especially during a recession, often more profitable for a firm to keep up operating rates in the papermill by an increase in distant overseas sales than by a price cut on a nearby market. In Figure 7.2 the sales increases in the markets denoted "other" during the recession periods 1971-71, 1976-78 and 1981-83 illustrate the prevalence of such a strategy.

In transactions between Scandinavian producers and nearby European customers, the site-specific quasi-rent (indicated by higher unit gross profits in Scandinavian sales on these markets) is thus to be divided under conditions of small-numbers exchange. During a recession the customer tends to have the strongest bargaining position. The mill price obtained in distant overseas sales constitutes a limit to the part of the joint quasi-rent that a customer can appropriate. During a boom there is a change of bargaining position. The Scandinavian paper producer can then increase the quasi-rent received on all sales (cf. the discussion in Section 3.4)

Figure 7.2 FOB Prices and Volumes for Swedish Exports of Unbleached Kraftliner, 1970-1983.

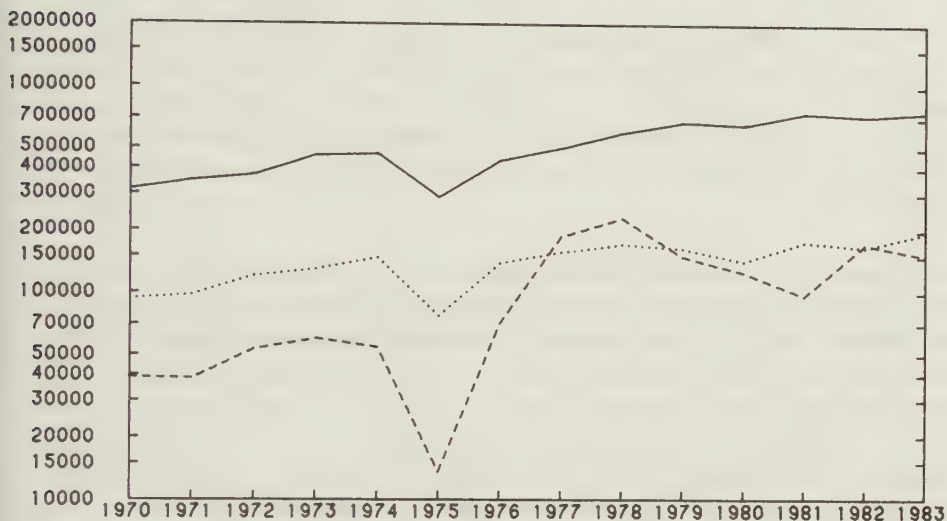
SEK/Tonne



Cont.

Figure 7.2 - Continued.

Tonnes



Source: SOS Utrikeshandel

Remark: Nearby markets = EEC (excl. Greece and Italy) and EFTA

Choice of Transactional Arrangement

Contracts. From a contractual viewpoint, sales on distant overseas markets are to a larger extent than in Western Europe characterized by spot sales. Long-term contracts such as reservation contracts, formal or informal, are thus primarily used in sales on nearby markets. This is a reflection of the priority given to assured quasi-rents in the nearby trade. As seen from Table 7.2 all the forward integration has also taken place on the nearby West European markets.

Long-term contracts of the reservation type represent one way to ensure quasi-rents on attractive liner/fluting markets. Both seller and buyer can benefit from such contractual arrangements. The seller is more assured of deliveries during recessions and can thereby keep higher operating rates and avoid some low-priced spot sales. The buyer, in turn, is more assured of supplies in boom periods and does

not to the same extent as otherwise have to cover shortages with high-priced spot purchases.

The existence of appropriable quasi-rents and a high degree of uncertainty about exchange conditions create post-contractual problems. In practice the reservation contracts are never legally enforced. The enforcement is instead of an informal nature, where priority in future deliveries and supplies is affected by non-acceptable breaches (cf. Section 5.4 concerning pulp reservation contracts).

According to representatives of the paper industry, the reservation contracts are considered as more binding for suppliers than customers. Low demand for converted products is a more acceptable excuse for not adhering to contract terms than reference to more profitable paper sales alternatives elsewhere.<28>

In recessions, deliveries of contracted quantities are often cancelled by the customers.<29> Rebates and other forms of more or less secret price cuts occur during recessions in order to match, e.g., US offers, while the price level is more distinct during booms. The part of the price line that is dotted in Figure 7.1 indicates this pattern.

Vertical integration. The problems of assuring quasi-rents on nearby markets by contracts have become increasingly severe in the shrinking non-captive West European markets. In important markets for Swedish producers such as the domestic market, the UK, West Germany, Denmark and France, box plants corresponding to 75 per cent and more of the total corrugated board capacity were integrated in 1976 with liner/fluting production based on virgin and/or waste fibres.<30> In France and Denmark the figures were as high as 90 and 87 per cent.

It is often difficult for a non-integrated liner/fluting producer to achieve more than a marginal position as supplier to an integrated box plant. The base quantity will be supplied by the integrated paper mill. Suppliers with a marginal position are likely to be last in during a boom and first out during a recession. Compared to the base suppliers they can probably take more advantage of high prices during a boom, but in return the losses are likely to be much larger during a recession. Because of the continuing forward integration, the risk of

suddenly becoming a marginal supplier on nearby markets increases at the same time as the number of alternative customers shrinks (i.e. the degree of small-numbers exchange increases).

In many cases the forward integration has been undertaken as a defensive measure when a stable supplier-customer relationship is threatened by a possible integration with a competitor in connection with, e.g., a financial crisis of a box producer or a succession problem.<31> The fear of being a marginal supplier initiates the forward integration.

A non-integrated paper producer also has reasons to fear a change in supplier-customer relationships if it is a producer of the complement material liner/fluting that integrates (i.e. even if the integration is not with a competitor). This is because forward integrated producers with complementary raw materials can make swap deals with each other. An integrated kraftliner producer can, for example, offer that an integrated fluting producer becomes a stable supplier of fluting to its box plants under the condition that the the same position is achieved vis-à-vis the box plants owned by the fluting producer. A company like SCA can in this way add another 15 per cent to its 35 per cent forward integration in kraftliner production.<32>

The transactional advantages of vertical integration compared to long-term contracts are increased control capabilities and harmonized profit incentives. Shifts of supplier and renegeing on contract terms can be prevented by fiat. Opportunistic changes of contract terms will also be less attractive because there are no pre-emptive profit claims between integrated stages. Transit inventories do not have to be large as long as internal supplies are assured. This means decreased risk that the box plants will have excessive inventories at the change of the trade cycle from boom to recession. Harmonized profit incentives can reduce the incentive for destabilizing speculation in inventories, at least with regard to internal supplies.

With such an inventory policy it follows of course that certain favourable opportunities during booms will be lost for the supplier and during the recession for the customer. This is one reason why producers/customers often choose only to have a base quantity of total demand/supply assured.<33>

There is also a disposability argument for vertical integration on the grounds of the increased control capability. An integrated box maker can simply be ordered to accept more deliveries during a recession, e.g.<34> In this way vertical integration helps to achieve higher operating rates of the liner/fluting machines without having to resort to low-priced spot sales. With regard to the higher fixed costs in paper production than in box-making this is a profitable policy.

Finally, the similarity in know-how between the paper and paper conversion stages is large enough to prevent forward integration giving rise to larger increases in internal transaction costs. The requirement of printing knowledge is less in the conversion stage than, e.g., for folding boxboard, and the expenses for purchase of liner and fluting amount to more than half of the total costs in box making.<35>

To sum up, both kraftliner and semi-chemical fluting are highly standardized commodities. The high capital-intensity of the mills makes it important to have high and stable operating rates and a high and stable unit gross profit (unit quasi-rent).

The highest quasi-rents can be obtained in trade on nearby West European markets. These are, however, markets of an oligopolistic character. Nearby trade can therefore be classified as characterized by a certain degree of small-numbers exchange (cf. Table 4.1). In such a trading situation short-term contracts are not likely to represent an efficient mode of assuring quasi-rents (cf. Section 2.3.4).

A high degree of uncertainty due to large cyclical demand variations and the ongoing process of vertical integration make it costly also to use more complete types of long-term contracts in nearby trade. The cyclical demand variations at the paper stage are aggravated because of cheap marginal North American supplies during recessions and destabilizing inventory changes. Vertical integration often implies a change of the roles of independent suppliers from a base to a more unstable marginal position. The dominant contract form in nearby market transactions is, instead, the reservation contract, an incomplete type of long-term contract (cf. Table 4.2).

The basic transactional advantages of vertical integration can be traced to the increased control capabilities and harmonized profit incentives of common ownership. Internal paper deliveries can be more strongly enforced and more easily varied in response to changes in the demand patterns of the non-captive parts of the West European markets. Vertical integration also offers the possibility of securing demand by the use of swap deals.

7.3 Sackcraft

7.3.1 Characteristics

Another paper product, also used as transport packing, is the paper sack. Similarly to corrugated board, vertical integration from stump to final conversion stage is common. Paper sacks are made of sackcraft.

Products. In the case of liner/fluting, customer specifications differ most in respect of width and grammages (ytvikter). But for sackcraft the customer specifications differ more with respect to strength, porosity, stretch strength and wet strength. As in the case of corrugated board, the producer of paper sacks usually serves a local market because of the bulkier nature of paper sacks compared with sackcraft and the particular demands of different geographical markets. The Swedish export share (export as a percentage of total production) is around 5 per cent for paper sacks, while almost 90 per cent of the sackcraft production is exported.

Swedish producers. Swedish production and export is dominated by four companies, Billerud, Korsnäs, Ncb and Fiskeby, which have paper machines with capacities larger than 100,000 tonnes/year.

Standardization. Sackcraft is a less standardized product than kraftliner and semi-chemical fluting. The customer specifications differ more from customer to customer. <36> It is therefore difficult to manufacture sackcraft for stock.

The most standardized type of paper sack is the refuse sack. In Sweden the refuse sack is the dominant type of paper sack. During the period 1976-1980 about 60 per cent of the total quantity of paper sacks delivered to the Swedish market was refuse sacks.<37> On the foreign markets, however, the refuse sack has a share of less than 10 per cent. The dominant sack type is the cement sack with a share of 35-40 per cent of consumption.<38> Paper sack production can therefore be considered more custom-oriented on foreign markets than in Sweden.

Trade and competition. Sweden is the largest exporter of sackcraft in the world. Of the total quantity traded internationally in 1979, Sweden accounted for about 50 per cent. On the EEC market, Sweden's position as major supplier is even more dominant with a share of more than 60 per cent of total imports.<39>

The EEC sackcraft market is more concentrated than, e.g., the kraftliner market, where Sweden and Finland have to face strong international competition from both the USA and Canada. The domestic production of waste based liner (testliner and schrenz) is also important. In fact, there is no other pulp or paper grades for which Sweden has a larger share of the West European market.<40>

North America holds a share of less than 10 per cent of total EEC imports of which most is imported from Canada into the UK, which makes it a much less important competitor on the EEC sackcraft market than on the EEC kraftliner market. Instead, Canada is a strong competitor on the markets in the Far East, where it has no disadvantage of higher transportation costs. On the EEC market there are more problems for Swedish sackcraft producers with the marginal quantities offered at low prices from East European countries such as Czechoslovakia and East Germany.

The sackcraft market in Europe is a stagnating market because of the competition from plastic sacks and bulk transport.<41> In spite of this, Sweden will probably remain a large producer, as sackcraft is a product where the strength of the Swedish cellulose fibre provides its largest comparative advantages.<42> The quality of the Scandinavian sackcraft is said to be superior to that of Canada. Canadian sackcraft is also too standardized compared with the types demanded by European converters.

Technical integration. As for liner/fluting, all Swedish sackcraft production is technically integrated with chemical pulp production. Capital-intensity is therefore high, both absolutely and by comparison with the conversion stage.

7.3.2 Integration Pattern

All Swedish sackcraft producers except for Bäckhammars Bruk are integrated into the conversion stage at home and/or abroad with majority or minority interests (see Table 7.3). Among the Swedish producers of paper sacks all but two, Johnson Emballage AB and Svenco, are integrated with sackcraft production.<43> The strong competition from plastic bags has also induced several forest companies to move into the production and/or marketing of plastic bags and plastic laminates in order to offer a full line of products.

Downstream integration at home is of an early date. Örebro paper mill (now a subsidiary to ASSI) started to manufacture paper sacks in 1909. Billerud's paper sack production dates from the 1930s and Korsnäs' from 1953.

Foreign integration is of a later date. Billerud started to acquire foreign paper sack firms in the mid-1960s. At the end of the 1960s, ASSI and Korsnäs began their forward integration abroad. Fiskeby and Ncb were integrated with conversion plants in UK and on the continent in the early 1970s (see Table 7.4). This integration followed upon investments in enlarged capacity and an integration movement on the continent.<44>

Table 7.3 Swedish Sackcraft Producers with Forward Integration into Paper Sack Production. Thousand Tonnes. 1983.

Company	Total capacity	Domestic integration	Foreign integration	Total integration (in per cent of capacity)
Korsnäs	ca: 300	22	58	27
Billerud	200	25	95	60
Ncb	170		42	25
Fiskeby	125		42 ¹⁾	33
ASSI	ca: 100	5		5
Bäckhammar	36			0

Source: Annual Reports

Remark: In a joint venture with the Finnish sackcraft producer Oy W Oy W Rosenlow, Fiskeby owns 50 per cent of a converter in the UK with a capacity of 22,000 tonnes of paper sacks per year. In the figure above only half of that capacity is included.

1 mill. sacks = 220 tonnes of sackcraft

Table 7.5 Foreign Integration into Paper Sack Production by Swedish Sackcraft Producers.

Company	Year of acquisition	Acquired company	Capacity tonnes/year
Korsnäs	1969	Wilhelmstal-Werke GmbH, W Germany	30,000
	1971	A&S Henry & Co Ltd, UK	7,500
	1976	Papiersakfabrik Junemann GmbH, W Germany	10,000
	1982	Flexer Sacks Ltd, UK	16,000
ASSI	1967	Flexer Sacks Ltd, UK (sold to Korsnäs in 1982)	

Cont.

Table 7.4 - Continued.

Billerud	1964	Robert L Fleming Ltd, UK	<1>
	1965	Manusac SA, Belgique (50%)	10,000 (1975)
	1975	Essex Sack, UK (acquired by Fleming)	<1>
	1982	Manusac merged with Sacallain (Belgique) in the new company S&M. Billerud's ownership share 16%.	n.a.
	1983	Walter Durbeck Papiersackfabriken and Polysackfabriken Walter Durbeck, W Germany (49%)	ca: 20,000
Ncb	1984	Bischof und Klein, W Germany (16,7%)	n.a.
	1971	Sachsa Verpackung, W Germany	n.a.
	1976	Sacallain SA, Belgique	n.a.
	1980	Charfa, France (10% of Charfa's shares are acquired in exchange for 75 % of Sacallain's shares)	n.a.
	1982	Sacallain merged with Manusac (Belgique). Ncb's share in the new company equal to 6,3%.	n.a.
Fiskeby	1983	Emballage de Quevilly, France (13%)	n.a.
	1971	Papropack Ltd, UK (50%)	22,000
	1976	Herkulus Verpackungswerke, W Germany	15,000
	1983	Natronag, W Germany	15,000

Source: Annual Reports

Remark: Unless otherwise stated the capacity figures refer to the situation in 1983.

<1> Together they form Billerud UK, Ltd. Capacity in 1975 was ca: 20,000 tonnes/year.

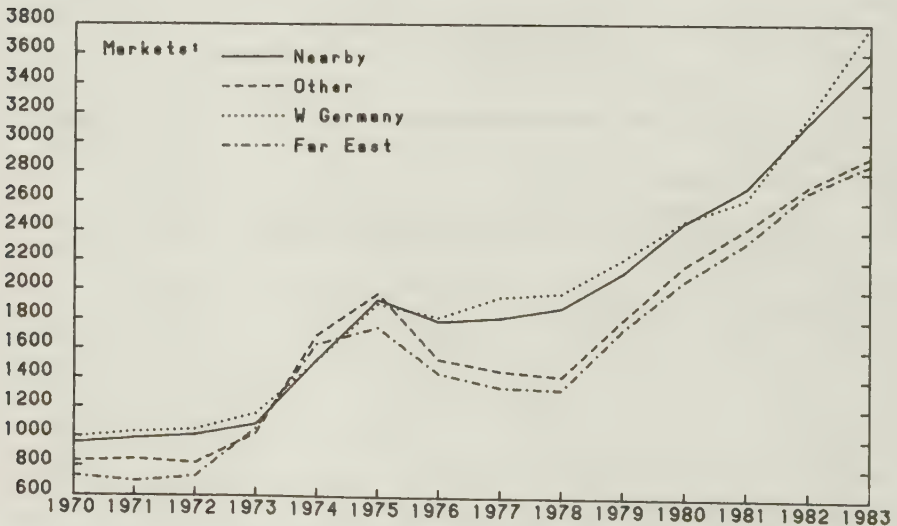
In 1976-77 the capacity of Scandinavian-owned paper sack firms amounted to 40, 30 and 20 per cent respectively of total capacity in the important Swedish export countries of the UK, West Germany and France.<45> The total degree of vertical integration was higher. In the UK it could be estimated at 68 per cent.<46> Since then Scandinavian foreign integration has increased even more (cf. Table 7.4). In addition to the UK more than 50 per cent of the paper sack production is also produced by integrated converters in West Germany and France.<47>

7.3.3 Transactional Analysis

As in the case kraftliner/semi-chemical fluting, there are no specific advantages of a technical nature between the paper and the conversion stages.<48> The incentives for the extensive forward integration that has taken place are, instead, primarily of the character described in Section 3.4.

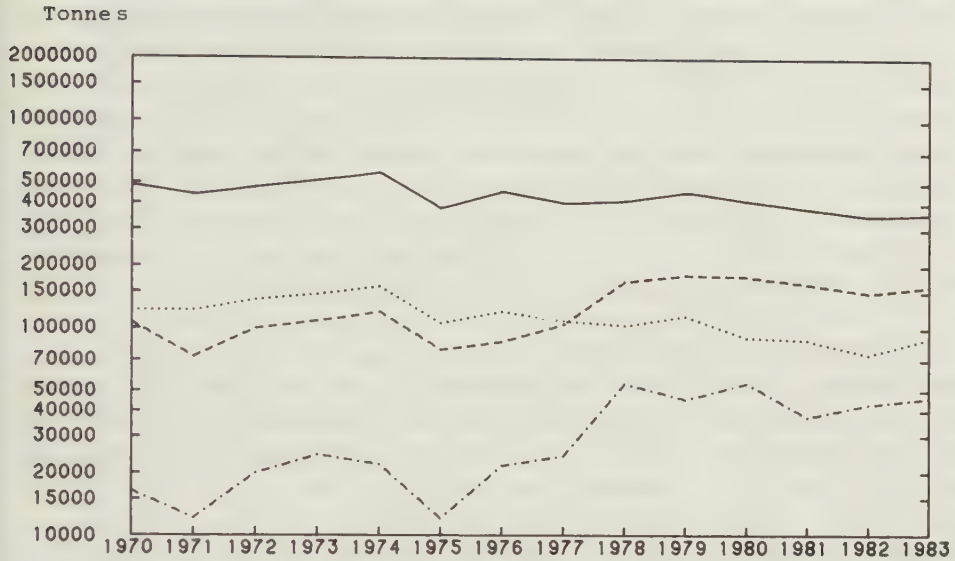
Figure 7.3 FOB Prices and Volumes for Swedish Exports of Unbleached Sackcraft, 1970-1983.

SEK/Tonne



Cont.

Figure 7.3 - Continued.



Source: SOS Utrikeshandel

Remark: Nearby markets = EEC(excl. Greece) and EFTA

Uncertainty. Cyclical fluctuations are more moderate than, e.g., for kraftliner. Demand variations, however, cause more problems for sackcraft as it is difficult to keep up operating rates by production for stock. In order to produce for stock the sackcraft producer must know in advance what specifications a sack producer is going to demand. Insofar as a specification is unique for a certain converter, stock production will result in a bilateral monopoly trading situation.

It is instead at the conversion stage that changes in paper inventories have an impact on the cyclical variations in sackcraft. The price changes for sackcraft are usually announced 60 days in advance.<49> If future price increases are expected, it is advantageous to build up inventories of specifications that will be used in the future.

Site specificity. The unit gross profit varies between different geographical markets. It is for Swedish firms larger and more stable on nearby West European markets than on distant overseas markets (see Figure 7.3). The differences in mill prices between the markets can be explained by the facts (i) that Swedish producers do not have any transportation advantage compared with their North American competitors on overseas markets such as in the Far East, and (ii) that superior quality is not as important on these markets as in Europe.<50> The Swedish sackcraft producers also face more inelastic demand on the West European markets because their market share totals about 50 per cent.

Several of the overseas markets are of a marginal character to the Scandinavian producers. During recessions, when the quantity demanded is low in Western Europe even if prices are substantially cut, distant overseas sales are often considered as the best way to keep up operating rates (Cf. discussion in Section 3.4 and Figure 7.3).

Choice of Transactional Arrangement

Contracts. To assure demand from nearby markets by long-term contract is more difficult for sackcraft than for grades with a higher degree of standardization such as pulp, kraftliner, semi-chemical fluting and newsprint. Sackcraft is manufactured to orders in which the customers specify quality, bulk, width etc. A long-term contract requires knowledge of the specifications for each shipment. Enforcement problems could also arise in the sense that the buyer takes advantage of the lower alternative value of an already produced specification for another customer in a renegotiation of contract terms.<51>

Because of the cyclical character of the sackcraft market it is difficult to specify price in a long-term contract.<52> Instead a long-term contracts often has a clause that price shall not be higher than for the most favoured customer or for other Scandinavian sackcraft of similar quality. This means that if a Swedish sackcraft producer has to meet the competition from an occasional North American or East European supplier by making a temporary reduction or rebate, it can have repercussions on the price received from all other customers.

It is important for the capital-intensive Swedish sackcraft producers to have stable relationships with their customers on the West European market. By being a base supplier, sales at low prices to non-traditional customers can be avoided during recessions.

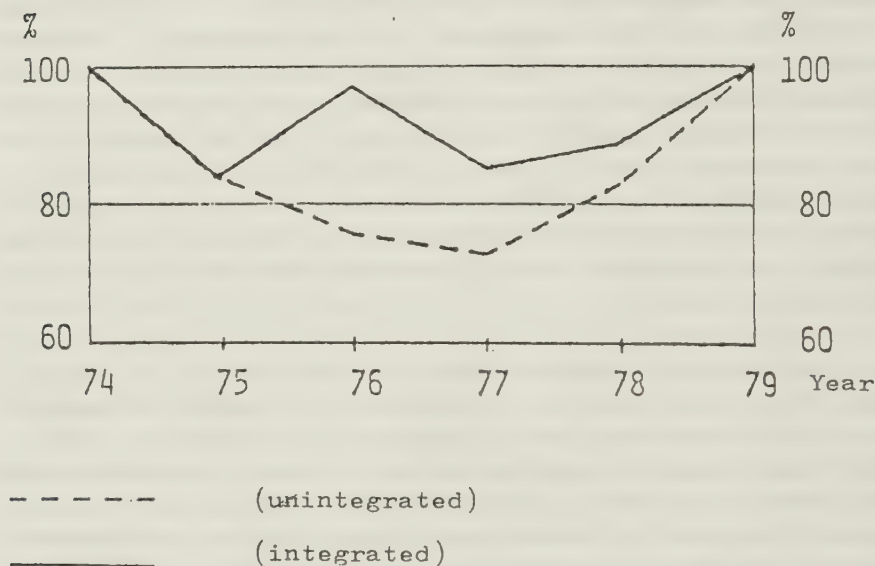
Vertical integration. The continuing vertical integration has increased the small-numbers exchange character of the West European sackcraft markets. The possibility of an independent sackcraft producer achieving and retaining a position as a base supplier has decreased. The cyclical fluctuations in the demand for the products of the non-integrated producers have become larger. The reason for this is that integrated converters can be induced to give priority to sackcraft produced within their business groups. The independent suppliers will be left to supply the rest. This has the effect that decreases in deliveries during recessions will affect foremost the non-integrated suppliers.

Forward integration is therefore sometimes undertaken as a defensive measure when a stable relationship with a large customer is threatened by a possible integration with a competitor. An example of this is ASSI's acquisition of the UK converter Flexer Paper Sacks Ltd in 1967.<53> Flexer had for a long time been ASSI's most important sackcraft customer in the UK market. In connection with a change in ownership it was feared that the converter would be acquired by a competing producer. In that case it was likely that ASSI's position as a base supplier would be negatively affected. A loss of expected orders from the UK market would then for a time have had to be compensated by lower-priced sales in other markets.<54>

The advantage of ownership compared to transactions by contracts is its superiority in achieving high stable operating rates without drastic reductions in unit gross profits during recessions. At the same time there is enough of a similarity in know-how between the stages to keep internal transaction costs in line. The implications for stable operating rates of vertical integration are illustrated in Figure 7.4. The example is taken from two paper-machines in the Swedish sackcraft industry of which one was operated by company with a high degree of vertical integration with paper sack production and the

other was operated by a company with a low degree of forward integration (labelled the "non-integrated machine" in the figure).

Figure 7.4 An Example of Higher and More Stable Operating Rates for Integrated Sackcraft Production, 1974-1979.



Remark: Average operating rates 1975-1978 were 79 per cent for unintegrated and 89 per cent for integrated sackcraft production.

As can be seen from Figure 7.4, the capacity utilization of the integrated machine is much higher over the business cycle 1975-1979. There are two main explanations for this difference in operating rates over the business cycle. Integrated conversion plants can be instructed to give priority to internal purchases from integrated paper mills. Integrated conversion plants can also be prevented from building up excessive speculative inventories of sackcraft during a boom.

The advantages of vertical integration are due to the enlarged control capabilities and harmonized profit incentives that curtail the propensity for destabilizing inventory decisions and increase the disposability of resources. The disposability argument for vertical integration can be illustrated by ASSI's ownership of Flexer.<55> The statistics show, e.g., that in 1975 the decrease in ASSI's deliveries of sackcraft to the UK market was only about half of the decrease in deliveries to the West German market. As a consequence of the much smaller decrease, the subsequent increase in deliveries to the UK during the period 1975-78 was only 8 per cent compared with a total export increase of almost 100 per cent. This is also an example of how vertical integration makes it possible to keep up both operating rates and unit gross profits during recessions.

To sum up, sackcraft shows a lot of similarities to kraftliner and semi-chemical fluting in the integration pattern and in the differences in unit gross profits between nearby and distant markets. The trading situation with respect to uncertainty and small-numbers exchange is similar also (cf. Table 4.1). In such a comparison it should also, however, be added that the Swedish sackcraft producers have between them a more dominant role on the West European sackcraft market, that there are no competing waste-based sackcraft alternatives and that, due to a lower degree of standardization, short-term contracts dominate in nearby market transactions (cf. table 4.2).

The continuing process of vertical integration has reduced the number of independent converting firms with which to have stable contractual relationships. Using an example it was shown how vertical integration could be applied as a defensive measure when a stable supplier-customer relationship was threatened by an eventual acquisition by a competitor.

The superior capability in keeping high and stable operating rates on forward integrated sackcraft machines was also empirically illustrated. Finally, an example of how ownership of a big converter made it possible to avoid larger reductions in sackcraft deliveries to nearby markets with site-specific quasi rents during recessions was presented.

7.4 Folding boxboard

7.4.1 Characteristics

Paperboard is the term used for paper qualities with a basis weight exceeding 225 g/m^2 .^{<56>} Paperboard is mainly used as folding boxboard for consumer packages or as graphical paperboard for book covers, greeting cards and advertising.^{<57>} The printed message is thus important. This can be considered as a difference for this product by comparison with corrugated boxes and paper sacks.

Products. The board can be solid or be two-ply or more. Depending on the ply number, board is given names such as duplex and triplex board. Among Swedish board products, a distinction can be made between solid bleached board (homogen kartong), duplex and triplex board (duplex and triplex kartong), white lined chipboard (returfiberbaserad kartong), liquid packaging board (dryckeskartong) and kraftboard (kraftkartong).^{<58>}

Solid bleached board has bleached sulphate pulp as raw material. Multi-ply board - duplex or triplex - has a bottom or middle layer made of mechanical pulp (stoneground or thermomechanical), while the remaining content is bleached chemical pulp. White lined chipboard is a multi-ply board mainly based on recycled paper.

Liquid packaging board is to be laminated with a plastic material in order to be able to contain and preserve the quality of liquids such as milk and juice. The main customer for liquid packaging material is Tetra Pak. Kraftboard is produced by Korsnäs and ASSI. The main raw material is unbleached sulphate pulp.

Factors that determine the quality of board are runnability in box machines, printability, stiffness along and across, rectilinearity in sheets for preventing misfits in printing machines, rectangularity and bulk.^{<59>} The printability is sensitive to factors such as dimension stability and rectangularity when the board is subject to moisture in the printing machines. Faults in these respects mean that different colours will not mesh with each other. No variations in bulk mean less adjustments of colour in printing machines.

Swedish producers. Among the different Swedish companies Iggesund produces solid bleached board; Papyrus, Kopparfors and Oppboga (subsidiaries to Papyrus), Södra Skogsägarna (Fridafors Bruk) and Billerud duplex or triple board; Fiskeby white lined chipboard; Kopparfors, Billerud, Korsnäs and ASSI liquid packaging board and Korsnäs and ASSI kraftboard.

Standardization. Folding boxboard is less standardized with regard to qualities and bulk than fluting, liner and sackcraft. The production is entirely order-oriented with few opportunities to manufacture for stock. According to customer specifications, orders are differentiated with respect to the demands of lamination, plastic extrusion and sheeting as well as on basis weights.<60>

Competition among the grades. Solid bleached board, duplex and white lined chipboard are to a certain extent substitute packaging materials. The most expensive quality is solid bleached board and the cheapest is white lined chipboard. A crude division of the market can be noticed for these three main qualities.<61> Solid bleached board is used within the food sector, especially for deep frozen food, because of its resistance to moisture. Duplex is dominant as a package material for dry foods. Whitelined chipboard is used mainly within the non-food sector and is dominant as a package material for detergents and matches, e.g.

Two examples can serve as an illustration of the competition within different market segments. As raw material for cigarette boxes the solid bleached board of Iggesund has to face competition from duplex manufactured by, e.g., Papyrus-Kopparfors. The cheapest quality, white lined chipboard, has made certain break-throughs within the food sector.

Technical integration. By contrast with the cases of liner/fluting and sackcraft producers of folding boxboard are in several cases not technically integrated with chemical pulp.

7.4.2 Integration Pattern

Two features characterize the historical pattern. Firstly, most of the capacity increases have taken place during the 1970s. Secondly, there has been a disintegration between the board and conversion stages during the 1970s.

These major capacity increases during the 1970s have thus not been followed up by forward integration in order to secure the demand. Instead there have been a few instances of vertical disintegration. Iggesund sold its converter Ceka Förpacknings AB in 1972 to Esselte and Södra Skogsägarna sold its converter JP Stenkvis AB to Swedish Match.

At present there is no forward integration into the converting industry, where Esselte and Swedish Match are the dominant firms. There are, however, some instances of forward integration into wholesaling and semi-wholesaling activities. Paperboard used in the printing industry is often sold through paper merchants. Papyrus-Kopparfors has an affiliated paper merchant, Papersgruppen AB (shared ownership with Stora Kopparberg).

Igesund has acquired distribution and sheet plants in the UK and Netherlands in 1979 and 1980 respectively. The purpose of these plants is to service customers who demand sheets of a format not supplied by the ordinary wholesalers. Since 1957, Iggesund has also had a minority interest in a Swiss converting company, Rentsch AG (ownership in 1981 equal to 48 per cent).

7.4.3 Transactional Analysis

By contrast with other packaging material made of paper, Swedish folding boxboard production is characterized by a lack of forward integration into the conversion stage. Among the paper grades with a subsequent conversion stage before the end-user, it is only fine paper and some specialty paper grades that show the same lack of forward integration. An analogy with fine paper is also interesting from the viewpoint that paperboard to be used in the printing industry is often

sold through the same distribution channels. In the case of Papyrus-Kopparfors, it is thus possible to speak of forward integration into wholesaling. The requirement for, e.g., printing knowledge in the downstream stage is in general greater than for liner/fluting and sackcraft.<62> Forward integration is therefore likely to bring forth larger increases in internal transaction costs than for other paper packaging material. As folding boxboard is rather close to the final consumer in the respect that it is to a large extent used in consumer packages, the demand variations are likely to be lower than for, e.g., corrugated case materials (i.e. a lower degree of uncertainty than for corrugated case material).

Finally, it is to be noted that Swedish producers of folding boxboard are relatively small compared to the size of the West European market. Only 8 per cent of the EEC consumption in 1979 was import from Sweden.<63> There is thus not the same degree of small-numbers exchange as for corrugated case material and sackcraft. An exception is liquid packaging material, where the Swedish producers have Tetra Pak as their main customer. One explanation of the lack of vertical integration in this case could be that there is too large a difference in character between the paper and paper conversion stage. The production and marketing of liquid packages involves a much more innovative entrepreneurial approach and also involves system-selling of packaging machines

Back-selling. A contractual way to increase and secure the demand for folding boxboard is to use a marketing strategy commonly called "back-selling".<64> This is a strategy where the paperboard producer jumps over one stage and concentrates selling activities on the end-user instead of the converter. The purpose is to persuade the end-user to choose not just a container as a package for a product but a container made of board from a certain mill. The container demand of the end-user will then also be a demand for a paperboard quality of a certain mill.

There are different ways of arriving at such a result. One way, that is associated with system-selling, is to cooperate with manufacturers of packaging machines in their R&D activities. By working together with machine manufacturers in the development of machines that can be safely run at very high speeds with a certain board quality, a "back-

selling" effect can be achieved. The machine manufacturer will go to the end-user and say "I have a machine that can be run at a higher speed than any other machine. We can guarantee that the machine can be run safely at this high speed provided that company X's paperboard is used".

R&D. With regard to R&D activities there are reasons both for and against forward integration. It is probable that a forward-integrated board producer will have greater difficulties in obtaining information from independent converters than a non-integrated producer.<65> Why give information about development possibilities for folding boxboard that can be used as a competitive means against yourself?

On the other hand, it can be useful to have full access to the machinery of a converter every time that it is deemed necessary to make a test-run at full scale of a new board quality. Iggesund has approached this problem by acquiring a large minority interest in a Swiss converting firm with a good technical reputation in the market. By having tested the product at full scale before selling it on the market, the introduction phase is facilitated.<66>

To sum up, there is, in contrast to the previously described packaging and wrapping grades, no forward integration into the converting stage in the Swedish folding boxboard industry (an exception is Iggesund's dominant minority interest in a Swiss converter). Major reasons for this lack of forward integration are the lower degree of both small-numbers exchange and uncertainty and a larger difference in character between the paper and paper conversion stages than for kraftliner, semi-chemical fluting and sackcraft (cf. Table 4.1).

7.5 Summary and Concluding Remarks

Forward integration in packaging and wrapping paper and board is best explained as a means of avoiding costs of small-numbers exchange on nearby markets (cf Section 3.4). There is no technical integration.

Among the different grades studied, forward integration by Swedish firms is common for kraftliner, semi-chemical fluting and sackcraft, but almost non-existent for folding boxboard. The integration has exclusively taken place on the West European markets (especially the domestic and EEC markets) and has been successively increasing during the last twenty years. For folding boxboard there are by contrast some examples of vertical disintegration.

One explanation for the choice of forward integration is the presence of small-numbers situations on nearby markets. Most of the Swedish production is sold on these markets and the market shares of the Swedish producers of corrugated case materials and sackcraft are substantial. For example, in 1979 imports from two large Swedish kraftliner producers amounted to 39 per cent of EEC kraftliner consumption and imports from four large Swedish sackcraft producers corresponded to 48 per cent of EEC sackcraft consumption. This is to be compared with folding boxboard where six Swedish companies had a market share of 8 per cent of EEC consumption in 1979.

In addition to the degree of small-numbers exchange, folding boxboard differs from the other grades with respect to uncertainty and similarity in know-how between paper and paper conversion stages (cf Table 4.1). By being close in processing to the final consumer folding boxboard has the most stable demand. The subsequent conversion stage also differs more in character than for the other grades. The lower degree of uncertainty and the greater dissimilarity in know-how at the paper conversion stage is probably the major explanation for the lack of vertical integration in liquid packaging board, which is a quality for which Swedish producers, by contrast with other qualities of folding boxboard, encounter a trade situation characterized by small-numbers exchange.

It is primarily during a recession (buyers' market) that unexpected changes in contractual relationships have negative effects on the quasi-rents of the Swedish producers of kraftliner, semi-chemical fluting and sackcraft. To compensate for a loss of orders on a nearby market by an official price cut is not an attractive strategy. The aggregate price elasticity is low and the unit price for a large portion of total deliveries is likely to be directly affected. A more profitable alternative is, in spite of lower FOB-prices, to keep up

operating rates by distant overseas sales

The continuing forward integration on the nearby liner, fluting and sackcraft markets has increased the degree of small-numbers exchange in transactions and made it increasingly difficult to attain an assured quasi-rent in a contractual relationship. Integrated converters can be expected to favour internal supplies during recessions. Fearing a change of role from a base to a marginal supplier, forward integration has sometimes been applied as a defensive measure by a paper producer to prevent the acquisition of a stable customer by a competitor.

Notes

1. Customs' Cooperation Council Definition.
2. See Klint (1979, p. 21).
3. Interview with Karl-Axel Rönno (Billerud).
4. See Klint (1979, p. 21) and DsI 1979:5, pp. 94-95.
5. See PPI October 1980, p. 91.
6. See PPI July 1977, p. 11.
7. See Ahgren (1982, p. 34) and Wigardt (1982).
8. See Brege (1979, p. 69).
9. See Ahgren (1982).
10. Interviews with Benke Berg (SCA) and Mattias Wigardt (ASSI)
11. See Ahgren (1982, pp 55).
12. According to Bo Rydin (1976, p. 8) the average total cost (ATC) of producing kraftliner in a Swedish mill with a capacity of 350,000 tonnes/year amounted to 1,660 SEK/tonne in 1976. If this figure is compared to the figures of variable costs (AVC) in 1976 as estimated by Data Resources, Inc. (data received from ASSI), a Swedish mill could in 1976 be estimated to have AVC and AFC each amounting to 50 per cent of ATC. Providing that this is the cost structure characterizing full capacity utilization, a price equal to $1.1 \times \text{ATC}$ implies, according to the formula $\text{B.E.} = 0.5 \times 350,000 / (1.1 - 0.5)$, a break-even point corresponding to an operating rate of 85 per cent (cf. note 37 in Ch 6).
13. Interview with Karl-Axel Rönno (Billerud). See also SPK, Konkurrensförhållanden på wellpappmarknaden, 1969, p. 6 in which the AVC (excluding labour costs) are estimated at 68 per cent of ATC. The figure 68 per cent is based on the produced quantity in 1968 and not on full capacity utilization. At full capacity utilization it is probable that the share of AVC should be higher.

14. See Svensk skogsindustri i omvandling, 1970, pp. 388-404.
15. Interview with Mattias Wigardt (ASSI).
16. See Klint (1979, p. 83).
17. See SOU 1981:43, p. 69.
18. See SCA Årsbok, 1979, pp. 212 and 474.
19. See SOU 1981:43, p. 71.
20. See PPI July 1980, p. 25.
21. See Esselte Annual Report 1981, p. 21.
22. See Brege (1979, pp. 69-70).
23. See SOU 1981:43.
24. See Brege (1979, p. 67), Klint (1979, pp. 66-68) and Ahgren (1982, p. 35).
25. According to FAO, World Pulp and Paper Supply and Trade, Vol. 1, 1977, p. 16, the price elasticity for paper and paper board other than printing, writing and newsprint is estimated to -0.2 in high income, -0.4 in developing and -0.7 in low income countries.
26. See discussion in Section 6.2.1 on trade and competition.
27. Interview with Karl-Axel Rönnbo (Billerud). See also Billerud Annual Report 1975, p. 16.
28. See Kinch (1974, p. 69).
29. See Brege (1979, pp. 75 and 77).
30. See SOU 1981:43, p. 114.
31. For examples, see SOU 1981:43.
32. See Report on SCA by Grieveson, Grant & Co., December 1981, p. 24.
33. See SOU 1981:43, p. 89.
34. Ibid., p. 85.
35. See SPK, Konkurrensförhållanden på wellpappmarknaden, 1969, p. 6 and SPK, Marknadsstrukturen i förpackningsindustrin, 1974, p. 28.
36. Interview with Evert Nilsson (Ncb) "As much as 95 per cent of the sackcraft is sold against specifications".
37. See SPK 1982:2, p. 5.
38. Interview with Olov Olsson (Fiskeby).

39. See Pulp and Paper Industry, OECD, 1979, Table 31.
40. SOU 1981:43, p. 65.
41. Ibid., p. 66.
42. See Industridepartementet, 1980, p. 16.
43. See SPK 1982:2.
44. Interview with Evert Nilsson (Ncb).
45. SOU 1981:43, p. 99.
46. Ibid., p. 77.
47. Interview with Evert Nilsson (Ncb).
48. See SOU 1981:43, p. 79.
49. Interview with Olov Olsson (Fiskeby).
50. See Industridepartementet, 1980, p. 18.
51. Cf. Kinch (1974, p. 70).
52. See SOU 1981:43, pp. 76-77.
53. Ibid., p. 74.
54. Ibid., p. 77.
55. Ibid. pp. 72-74.
56. See SPK 1979:6, p. 58.
57. Interview with Jörgen Strömberg (Iggesund).
58. See Brege (1979, pp. 49-50), SPK 79:6, p. 58 and Iggesund Annual Report 1973, pp. 8-10.
59. Interview with Jörgen Strömberg (Iggesund).
60. See Brege (1979, p. 48).
61. Ibid., pp. 49-50.
62. See SPK, Marknadsstrukturen i förpackningsindustrin, 1974, p. 28.
63. See Pulp and Paper Industry, OECD, 1979.
64. Interview with Jörgen Strömberg (Iggesund).
65. Interview with Olov Olsson (Fiskeby).
66. Interview with Jörgen Strömberg (Iggesund).

8 FORWARD INTEGRATION - PRINTING AND WRITING AND TISSUE PAPER

8.1 Introduction

In the last chapter different paper grades used for packaging and wrapping purposes were studied. These grades are raw materials in a subsequent conversion stage that produces paper containers and sacks. With the exception of folding boxboard, forward integration into the conversion stage is common.

This chapter considers the remaining grades of paper: viz. (1) those used for printing and writing purposes (newsprint, magazine paper and fine paper) and (2) those used as absorbent paper for household and sanitary purposes (tissue paper).

Newsprint and magazine paper differ the other two grades in the respects that there is almost complete backward integration with pulp production (of which the integration with mechanical pulp production is always of a technical nature) and that predominantly unbleached pulp is used. Otherwise, the paper sector studied in this chapter can be denominated "the white sector", since mainly bleached pulp is used in the production of fine paper and tissue paper.

As in the last chapter, the study of each grade is organized in subsector characteristics, integration pattern and transactional analysis.

8.2 Newsprint and Magazine Paper

8.2.1 Characteristics

Products. Mechanical pulp is the dominant pulp grade in the production of newsprint and magazine paper. Newsprint is, e.g., manufactured out of 75-90 per cent mechanical pulp and 10-25 per cent chemical pulp to give strength to the paper.<1> If thermomechanical instead of roundwood pulp is used, the proportion of mechanical pulp can be

higher. Today, secondary fibre in the form of de-inked waste paper is also used in the production of newsprint in order to keep down production costs.

While the strength of chemical pulp is important for the runnability of the newsprint in the newspaper printing machines, the mechanical pulp is important for printability. The Swedish mills use mainly unbleached pulp in paper production. To obtain as bright a paper as possible, fresh spruce is the wood of choice as raw material in pulp production.

Magazine paper is a calendered and also sometimes coated paper containing more chemical pulp than newsprint. The paper is used mainly for popular magazines. Most of the magazine paper in Sweden is produced on old newsprint machines that are much slower and narrower in size than modern newsprint machines.<2>

Swedish producers. Among the present four producers of newsprint - Holmens Bruks AB, Hylte Bruks AB, Stora Kopparberg AB and SCA - Holmen was the first company to produce newsprint. By the end of the nineteenth century Holmen had started its production of newsprint.<3> The second oldest newsprint producer is Stora Kopparberg. A newsprint mill was erected at Kvarnsveden in 1901. SCA became an important newsprint producer at the end of the 1950s, when Ortviken was converted from a sulphite mill to a newsprint mill.

The fourth newsprint company, Hylte Bruk, is of a recent date. The first paper machine was installed in 1972. In 1970 Hylte Bruks AB was formed as a joint venture between the three Wallenberg companies Ry AB, Stora Kopparberg and Papyrus, the Swedish state-owned company ASSI and the West German company Feldmühle, with ownership shares of 37.5, 10, 7.5, 20 and 25 per cent respectively. The sale of the output was arranged through a 15 year contract with Stora Kopparberg and Feldmühle, which also produces newsprint in West Germany.<4> The ownership structure has subsequently been changed (in 1977) so that Papyrus has 55, Stora Kopparberg 20 and Feldmühle 25 per cent of the shares. ASSI has left the venture.

Standardization. Newsprint is the dominant grade in Swedish paper production (see Table 7.1). The degree of standardization is high. It is considered to be even higher than for kraftliner.<5> In spite of the standardized nature of newsprint, the demand is of a less cyclical nature than for most other large Swedish pulp and paper grades that are export oriented.

The strong ties between supplier and customer contribute to the demand stability. One reason for this is the importance of service. The publisher of a newspaper is dependent on continuous deliveries of newsprint. The high daily consumption implies that many publishers, because of lack of storage space, only have stocks sufficient for a few days output.<6> As the possibility of storing the newsprint at the publisher is limited, demand fluctuations because for stock-piling reason is not a serious problem. There are examples of very large newspapers that print on paper delivered the same day. A minor delay in newsprint deliveries can then be disastrous. The losses in gross profit from disruptions in the publication scheme of a newspaper are huge.<7>

Besides availability there can be other problems for a publisher in a change of newsprint supplier. The newspaper machines run at high speeds. Breaks in the paper web are costly. There is always a risk that a change of supplier will, at the outset, increase the number of breaks in the web. A period of adaptation can be needed before the necessary adjustments have been made.<8> It is because of the risk of breaks in the web and the need for continuous deliveries that publishers value service highly. As a precautionary device many newspapers have, for these reasons, more than one newsprint supplier.

The fact that the cost of newsprint amounts to only about 15 per cent of total cost for most newspapers enforces the importance of service relative to price.<9> This is to be compared to, e.g., kraftliner and sackcraft, which account for more than 50 per cent of the buyers' total costs.

Trade and competition. In contrast to the large export-oriented grades such as kraftliner and bleached sulphate pulp Sweden has a comparative advantage vis-à-vis its international competitor North America in the production of newsprint, even at exchange rates lower than 5 SEK per

dollar.<10> The more expensive Swedish wood exerts less influence on total cost than for most other grades insofar as the value added in the integrated newsprint mills with large modern paper machines is high and the wood consumption per ton is low.<11> Furthermore, the transportation advantage is also higher for newsprint than, e.g., for kraftliner and bleached sulphate pulp.<12> North American competition on the EEC markets is therefore more easily met than for other grades.

The newsprint market is of an oligopolistic character with a few big sellers in international transactions.<13> The four Swedish producers, SCA, Hylte, Holmen and Stora Kopparberg, have on average an export share of 80 per cent in their sales. The Swedish share of the EEC market steadily increased from 12 per cent in 1970 to 20 per cent in 1979.<14> At the same time self-sufficiency in the EEC decreased from 17 to 12 per cent.

This falling self-sufficiency is primarily a result of the difficulties of unintegrated newsprint mills in EEC in competing with the more efficient integrated Scandinavian mills.<15> There have also been less trade barriers to international trade on the EEC newsprint markets than for other paper grades.<16> Most of the Swedish exports are concentrated on the UK and West German markets where the shares were 13 and 23 per cent respectively in 1979.

There is concentration on both the sellers' and the buyers' sides of the newsprint markets. On the Swedish market, e.g., Svenska Tidningspappersbrukens Förening represents the Swedish newsprint producers in annual price negotiations with the newspaper publishers, who are represented by the organization Tidningsutgivarnas Förlags AB (TU). On the continent, organizations similar to TU can be found in Denmark and France. In the export of newsprint to these countries sales agreements are made with these organizations instead of the individual newspaper publishers. In the UK there are large publishing houses that have considerable bargaining strengths. On the sellers' side, the Swedish producers have some cooperation in their exports.<17>

Contracts. The most common contract forms in Swedish newsprint sales are long-term contracts. Usually these contracts cover a time-period of one year.<18> There are also in the trade contracts running over a number of years.<19> By contrast with long-term contracts in, e.g., the pulp and kraftliner trade, price as well as volume is specified. Price is also set in local currency instead of US dollars. The prices are fixed for six months or one year a time. There are also often price clauses with respect to changes in input prices and foreign currency.<20> Spot contracts are used in distant overseas sales.

Most Swedish companies sell to a large extent through their own sales companies on the EEC markets.<21> Trading houses such as Elof Hansson are primarily used in distant overseas sales.

Technical integration. In the case of newsprint the production chain has fewer stages than for most other paper products. The paper is sold directly to the end-user, the newspaper publisher. With the exception of waste paper and small amounts of chemical pulp for one or two mills, all pulp is internally produced in Sweden. All the Swedish mills are also technically integrated with mechanical pulp production.

8.2.2 Integration Pattern

Newsprint differs from most other paper grades in the respect that there has been no forward integration into the subsequent production or wholesaling stages. There are, on the contrary, instances of backward integration from newspaper to newsprint production.

Several newsprint companies in, e.g., the UK were founded by large newspaper groups.<22> Since then the ownership interests of the UK newspaper industry in newsprint have diminished. Other countries where newspaper publishers own and control newsprint production are Australia and the USA.<23> Integration has thus been backwards and not forwards. In Sweden the large newsprint mills were, however, founded by forest companies and not publishing firms.

A Swedish example of publishing firm interests in newsprint production is Holmens Bruk AB. The Swedish newspaper company Dagens Nyheter owns 19.8 per cent of the shares and has 30.8 per cent of the votes in Holmens Bruk. Dagens Nyheter is the largest morning paper in Sweden, while Holmen is the largest producer of newsprint and magazine paper. The largest shareholder in Dagens Nyheter is the Bonnier group, which is the largest publisher of popular magazines in Sweden.

The cartel Svenska Tidningspappersbrukens Förening has existed since 1916. From the 1950s, it has accounted for all sales of newsprint in Sweden.<24> The cartel is in the form of a sales organization through which all domestic sales are made. There is also a corresponding organization on the buyers' side of the market, Tidningsutgivarnas Förlags AB, handling all purchases of newsprint for the newspaper companies.

A Swedish pulp mill at Sofiehem (Umeå) with an annual capacity of 140,000 tonnes mechanical pulp has been owned since 1937 by Bowater (UK), the largest newsprint producer in the world. This mill, together with another mill which was also producing mechanical pulp, were acquired with the purpose of avoiding the effects of a Scandinavian cartel for mechanical pulp.<25> The cartel, the Mechanical Pulp Suppliers Association, was formed at the end of 1935 to support price increases by the restriction of output.<26> Bowater was at that time dependent on Scandinavian supplies of mechanical pulp for its paper mills in the UK. The acquisition of the pulp mill was a way of avoiding the effects on price and output of the cartel (cf. the discussion in Section 3.2.1)

8.2.3 Transactional Analysis

Site specificity. In contrast to most other paper grades there is no forward integration in Swedish newsprint production.<29> At first sight this may appear strange. The industry is capital-intensive with almost complete integration with pulp production. It is a standardized product. Swedish production is export-oriented and sold mainly on nearby markets of an oligopolistic character. For reasons already described under the headline "trade and competition" in Section 8.2.1, the trade situation on these nearby markets can to some extent be

characterized as small-numbers exchange. During recessions the difference between unit gross profits on nearby and distant overseas markets can be interpreted as an indicator of the size of the site specific quasi-rent (see Figure 8.1).

Uncertainty. Demand is, however, more stable for newsprint than for most other paper grades. Operating rates have been higher during the period 1970-1980 than for Swedish paper production in general.<28> Figure 8.1 also shows relatively moderate variations in exported quantities both for "nearby" and "other" markets. By contrast with kraftliner and bleached sulphate pulp, e.g., it was possible to avoid price decreases during the 1970s.<29> The problems of keeping up operating rates and unit gross profits during recessions have therefore been less severe than for most other export-oriented grades.

Choice of Transactional Arrangement

Internal transaction costs. Another factor that explains the lack of forward integration is the different nature of newspaper publishing from newsprint production. Newsprint cost accounts for about 15 per cent of total cost for a newspaper. This is much less than in, e.g., corrugated board and paper sack production where the paper raw material cost corresponds to more than 50 per cent of total costs. Activities that are not related to the direct change of physical paper characteristics such as journalistic and printing skills are more important in newspaper publishing. As a consequence managerial competence required in newspaper publishing is of a special nature differing from that required in newsprint production. It is therefore likely that internal transaction costs in the coordination of vertically integrated stages exceed the transaction costs incurred in market-mediated exchanges (cf discussion in Section 2.5). Furthermore, there is only a small portion of capacity (about 4 per cent) that can be assured by forward integration with, e.g., a Swedish newspaper of average size.<30>

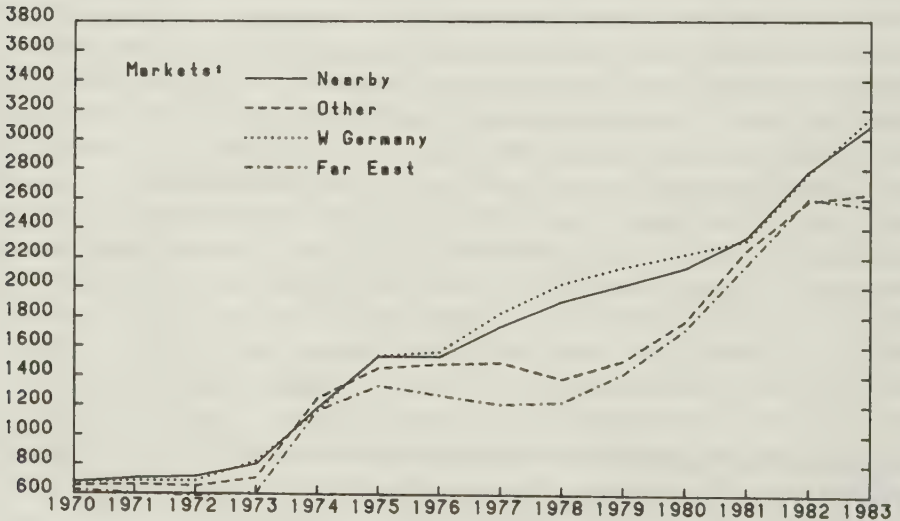
Contracts. Due to the stability of demand, the Swedish newsprint industry has managed to keep up operating rates and unit gross profits in contractual transactions. The dependence of the newspaper publisher on continuous newsprint supplies and the relatively low cyclical fluctuations in newspaper consumption compared to other paper based

products promote this demand stability. Cooperation in newsprint sales may also have contributed to stability. During recent decades there have been no price wars. Because of the demand stability, problems of small-numbers exchange are less likely to occur than for kraftliner and sackcraft, e.g.

The long-term contract is the dominant contract form in the sales of Swedish newsprint.<31> Unlike other paper grades, such a contract contains a specified agreement on price. Spot sales are primarily made on distant overseas markets. Often these spot sales are motivated by losses in orders during recessions on West European markets. Instead of cutting the price on these nearby markets it is deemed more profitable to keep up operating rates with low-priced spot sales on distant overseas markets of a marginal character.

Figure 8.1 FOB Prices and Volumes for Swedish Exports of Newsprint, 1970-1983.

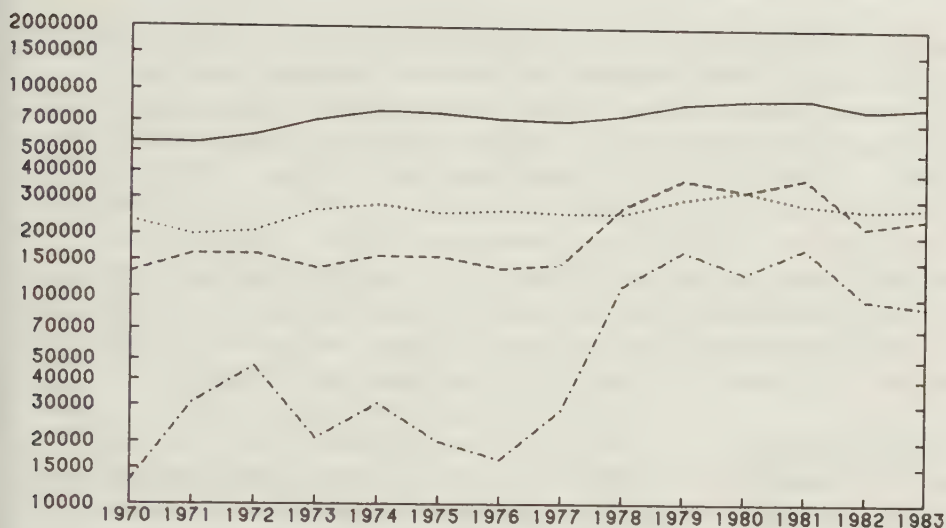
SEK/Tonne



Cont.

Figure 8.1 - Continued.

Tonnes



Source: SOS Utrikeshandel

Remark: Nearby markets = EEC (excl. Greece), EFTA and Spain

As illustrated by the price statistics from newsprint sales on the West German market in Klint 1979 (p 64) it has also, by contrast with most other export-oriented paper grades, been possible to avoid price reductions during recessions. Stable contractual relationships on the nearby markets in particular are promoted by refraining from undue increases in prices when there is a sellers' market.

To sum up, the absence of forward integration in the capital-intensive Swedish newsprint industry can be explained by the relatively stable demand position and the high internal transaction costs of vertical integration (cf. Table 4.1). It has been possible to achieve sufficiently high operating rates and unit gross profits by use mainly of long-term contracts in nearby trade and short-term contracts in distant overseas trade. These long-term contracts are more closely specified than long-term contracts used in nearby trade of other paper grades, such as kraftliner and semi-chemical fluting, that face a more uncertain demand situation (cf. Table 4.2)

8.3 Fine Paper

8.3.1 Characteristics

Products. Fine paper is the term used for all types of printing and writing paper except newsprint and magazine paper. These grades of paper are made mainly of bleached chemical pulp in the furnish. Fine paper can be divided into 4 categories: (i) woodfree coated, (ii) woodfree uncoated, (iii) wood containing coated and (iv) wood containing uncoated. Woodfree paper contains less than 10 per cent mechanical pulp while wood containing paper (whether coated or uncoated) has more mechanical pulp. Coating is a process where a mixture of pigments (e.g. china clay), bonding agents (e.g. starch and glue) and other additives are coated on the paper. By coating the printing and colouring properties of the paper are improved.

Swedish producers. In Sweden mainly woodfree paper is produced. Swedish producers of woodfree paper are MoDo, Södra Skogsägarna, Papyrus, Nymölla, Stora Kopparberg, Munkedal and SCA (in Wifstavarfs Bruks AB which is a joint venture with PWA, a West German company).

Standardization. Fine paper is produced according to customer specifications. These specifications can differ from customer to customer with respect to tint, surface characteristics and porosity as well as basis weights and sheet sizes. Not so long ago every customer specified all these five characteristics in their orders.<32> Since then there has been a change towards an increased degree of standardization to obtain longer runs before the modern large and fast paper machines are reset to a different specification. Fine paper can still, however, be regarded as one of the least standardized of paper grades.

For large paper machines it is more important to have long runs of a certain quality or specification than it is for a small machine. Jaakko Pöyry (1980) has shown how the profitability of a large machine will be much more positively affected by increases in length of run for a certain specification than is the case for a small machine.

The bulk grades permitting long runs consist primarily of fine paper produced in reels. A plant like MoDo's at Husum with two very large paper machines delivered in 1982 80 per cent of the production is in form of reels. In the graphical industry reels are used in web fed printing machines. Coating base paper to be used in mills specialized in coating (as at MoDo's Silverdalen) are also delivered in reels. Other typical products produced from reels are collage notebooks, business forms and data paper. Among the sheeted papers, A-4 and to a certain extent also A-5 to copy machines can be considered as bulk products.

Examples of special products suitable for smaller more versatile machines are coloured paper, labels and different kinds of coated paper. These specialized products are delivered as format-cut sheets. MoDo's Silverdalen and Papyrus in Mölndal are examples of smaller mills with this product orientation.

Trade and competition. Larger orders are mostly delivered from the mills either through direct sales to the end-users or via sales to a paper merchant. Typical end-users, whose orders are delivered directly from the mills, are converters producing business forms, envelopes and collage notebooks.<33> If an order is larger than 5 tonnes the order is usually specially produced. For orders less than 5 tonnes, delivery from the stock of the merchant or from the stock of the mill is usual. Of the sales volume, approximately 50 per cent goes through merchants.<34>

There has been a tremendous change in the size of fine paper machines during the last fifteen years. In 1970 there was hardly any machine in Europe with a capacity larger than 75,000 tonnes/year.<35> Since then the situation has changed with ten machines larger than this size by 1979, of which three machines were situated in Sweden (two at Husum and one at Nymölla). In 1982 a fourth large machine has gone into production at Wifstavarf and in 1985 a fifth at Husum. This change towards larger paper machines is a result of new paper-making technology making large scale production possible.<36>

With the introduction of large machines Swedish production has become more bulk-oriented and standardized and the Swedish export share has risen from 39 per cent in 1970 to 58 per cent in 1980 and 67 per cent in 1983. The change towards more bulk-oriented production has increased the sensitivity of demand to cyclical fluctuations. This is especially the case for the new large paper mills, while smaller domestically-oriented mills producing specialty kinds of paper have a more stable demand.<37> Sales to wholesalers or merchants tend also to be less sensitive to changes in the business cycle than direct sales to fine paper consumers.

Self-sufficiency in the EEC, which is the largest Swedish export area, is very high (about 87 per cent in 1979).<38> The Swedish share of the EEC market amounts therefore only to 3 per cent (1979's figure), which is a low percentage compared to other paper grades. Other West European countries such as West Germany and Finland are larger exporters. There is no competition from North America on the West European market.

Technical integration. Because of the large investments during the last 15 years the Swedish fine paper industry has become more capital-intensive. The degree of backward integration has increased as these new paper machines are completely internally supplied with pulp. Three of the machines are also completely technically integrated with pulp production.

8.3.2 Integration Pattern

In the early 1960s the stages in the chain - pulp, paper, merchants (wholesalers) and end-users - were characterized by a lack of vertical integration. The paper mills were small. During the first half of the 1970s the big technically integrated paper mills at Nymölla and Husum were built. The forward integration into merchanting started almost at the same time as the decisions to invest in these large paper machines were made.

At the end of the 1960s Papyrus began an integration into merchanting by acquiring Svanströms Pappersagentur (from Esselte), Söderberg & Gubben and Nordström & Tingström. Munkedals AB, another Swedish fine paper producer, was involved early in this forward integration. The ownership structure was afterwards altered by a sale of shares to Grycksbo Pappersbruk (a fine paper producer), which had been acquired in 1966 by Stora Kopparbergs Bergslags AB. After that, Papyrus, Munkedal and Grycksbo each owned one third of the shares in the merchant firms. In 1972 Pappersgruppen AB was founded through a merger between the different merchant firms owned by the three paper companies. At the same time the big fine paper machine (90,000 tonnes/year) in Nymölla (owned 100 per cent by Papyrus at first) was brought into action.

Modo became involved in merchanting when it acquired AB Brusafors Hällefors in 1970. A little earlier the decision to invest in a large fine paper mill at Husum had been taken. The merchant company Svenskt Papper AB was a subsidiary to Brusafors-Hällefors, which also owned a fine paper mill at Silverdalen.

Since the end of the 1960s there have thus been both forward integration into and a concentration trend in the merchanting stage in Sweden. By 1983 there were only two paper merchanting companies, viz. Papergruppen AB owned by Papyrus/Stora Kopparberg and AB Svenskt Papper owned by Modö. This change towards a concentration in merchanting on two integrated companies coincided with the investments in three big paper machines at Nymölla and Husum during the first half of the 1970s.

MoDo, which is Europe's second largest manufacturer of fine paper, has a more multinational character than the other Swedish fine paper producers. Already by 1963 it had acquired Papeterie de Pont Ste Maxence (PPM), a French fine paper producer. In recent years it has also moved into merchanting on an international scale by buying up merchant companies in France (1978), UK (1979) and Netherlands (1981).

A recent investment in the fine paper sector in Sweden is a joint venture between SCA and PWA. Together they have invested in a new fine paper mill at Wifstavarf. The paper machine has a capacity of around 150,000 tonnes/year, which is the same size as the biggest machine in

MoDo's Husum plant. The West German company PWA, one of the two owners, is the biggest fine paper producer in Europe of woodfree uncoated paper. The new paper mill at Wifstavarf will not at the outset be technically integrated with pulp production.

8.3.3 Transactional Analysis .

The Swedish fine paper industry has experienced big changes during the last fifteen years. Large-sized paper machines have been introduced, a standardization and export orientation process has taken place and there have been both backward and forward integration. Backward integration and the larger paper machines have increased capital intensity in the industry. By 1983, only one of the total of six Swedish fine paper producing companies is not integrated with pulp production.<39> Forward integration has been with wholesaling (merchanting), which is more like fine paper production in its know-how requirements than the subsequent printing stage.

Site specificity and uncertainty Integration into merchanting has taken place contemporaneously with these increases in machine sizes, capital intensity, export orientation and standardization. One important incentive behind forward integration is to assure site-specific quasi-rents on nearby markets for the new capital-intensive mills (cf Section 3.4). For certain of the standardized paper grades a small-numbers exchange situation has gradually emerged as competition has become more oligopolistic.

Fine paper has a cyclical demand. In a buyers' market, low aggregate price elasticity and rapid reactions from competitors make it difficult to keep up operating rates for standardized grades even if price is much reduced. <40> Integration with merchanting offers an opportunity in this case to increase internal supplies during recessions instead of increasing volume by direct price cutting. The demand facing the merchants tends also to be more stable over a business cycle.

Standardization and specialization. Other effects of increased control and planning capabilities and harmonized profit incentives through common ownership are important. The development towards larger paper machines has raised the interest of the paper producers in standardization of the merchants' product assortment. Through standardization and specialization of mills with different machinery equipment productivity can be substantially increased.

In the first phase such standardization is likely to be more effectively achieved through ownership than by contracts with independent merchants. A subsidiary merchant can directly by fiat be induced to standardize the product assortment. The alternative is to obtain standardization by, e.g., price cuts on certain grades by way of incentive. To persuade an independent merchant in this way to take the lead in a reduction of the assortment from 3000-4000 to 1000-1500 items will probably prove to be both expensive and difficult.

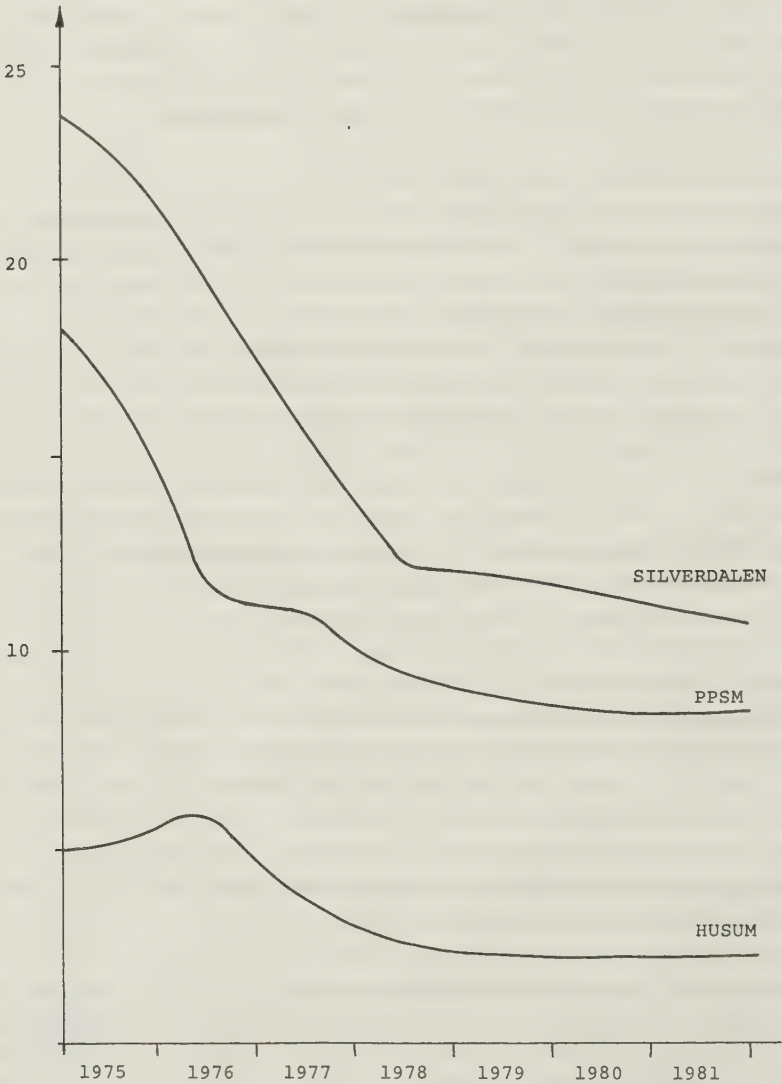
With subsidiary merchants there is also the possibility of promoting mill specialization by entering into long-term agreements with paper companies producing complementary grades. Such agreements have been made in Sweden between Pappersgruppen and Munkedal, Pappersgruppen and Holmen and between Svenskt Papper and Klippan.<41>

The integrated fine paper company MoDo can serve as an example of the productivity gains from standardization and specialization. The specialization of the product assortment has gone a long way at this company. In 1970 the two smaller mills, PPSM and Silverdalen, each produced some 20 different products. Ten years later, Silverdalen made only four products and PPSM some six to eight (see Interview with Löf in Paper June 1981). The associated increases in productivity at the different mills are illustrated in Figure 8.2.

The same pattern of specialization can also be found among the other Swedish fine paper producers. Among the mills associated with Pappersgruppen, it is the large paper machine at Nymölla which produces the bulk products. The new big paper machine at Wifstavarf also produces bulk products, while PWA produces more format products, where closeness to the market is important.<42>

Figure 8.2 Productivity Differences between Three Fine Paper Mills.

Man hours per tonne
Produced paper



Source: MoDo Papper AB 1982-04-23

Brand name. Another advantage is that the possibility of creating a brand name is improved if a producer has his or her own outlets. Merchants usually sell the fine paper under their own names. The mill producing the product is not associated with the quality of the paper. If a mill wants to establish a brand name, which makes demand more stable and favours quality competition, forward integration is probably part of an efficient strategy to achieve that goal. An independent merchant is not likely to have the same incentives as a subsidiary merchant to engage in activities that make it dependent on and strengthen the market position of a particular paper producer.

Information. An additional factor to consider is that information about demand, stocks and free capacity can be more easily and quickly obtained in an integrated system.<43> Pappersgruppen can serve as an illustration of the informational advantages in an integrated system.<44> A data system has been designed that keeps track of the paper stocks held at different warehouses and at the different associated paper mills. Information about order backlogs, free capacity at the mills, etc. is also plugged in. If a customer requires a quantity of a certain grade and format, the merchant can, via the data system, immediately locate it among the different warehouses and mills. It is therefore not necessary to stock each item in a safe quantity at each warehouse. Deliveries can be made quickly and promptly with smaller stocks. Such an information system ties producers and merchants together and thereby creates a small-numbers exchange situation that favours common ownership solutions.

To sum up, technical changes making large scale fine paper production possible have increased capital-intensity, export-orientation and product standardization in the industry during the last fifteen years. Contemporaneously there has been forward integration into merchanting in the Swedish fine paper industry. One major explanation for this forward integration is to avoid costs of small-numbers exchange by assuring demand on nearby markets. Other explanations are that forward integration is an efficient way of speeding up the process of standardization, to achieve a higher degree of specialization among mills with different machinery equipment, to establish a brand name and to build up integrated informational systems.

8.4 Tissue Paper

8.4.1 Characteristics

Products. Tissue paper is mainly used for sanitary and household purposes. The end-user is mainly the individual consumer in a household. Only about 25 per cent of the total sales in SEK are made to industrial users.<45> The remaining 75 per cent of the sales are distributed via wholesalers and retailers to the individual consumer. The wholesalers can be ordinary wholesalers carrying all kinds of food and non-food articles for the household or paper merchants that also sell fine paper and printing paperboard.

The different tissue products are toilet paper, kitchen towels, industrial wipers, table napkins, facial tissues, handkerchiefs, diapers and others. The most important product in terms of sales is toilet paper, which accounted for 54.6 per cent of the total tonnage of tissue products consumed in Western Europe in 1979.<46>

Swedish producers. Swedish producers of tissue paper are Mölnlycke (SCA), MoDo, Fiskeby, Klippan (Södra Skogsägarna), Lilla Edet (Ncb), Munksjö and Duni Bilå (Grafoprint).

Standardization, trade, competition and technical integration. Other characteristics of the tissue market are the relatively large importance of marketing compared with other paper grades, the local character of production and the low sensitivity to changes in the general trade cycle.<47> Marketing is important as tissue paper is usually technically integrated with conversion and mainly has individual consumers as end-users. Tastes differ from country to country and it is important to have a brand name.

Production is of a local character, primarily because transportation costs for bulk tissue and converted tissue are much higher than for other paper grades. Only 35 per cent of the tissue production was exported in 1981 compared to 75 per cent for the total Swedish paper industry. Most of these exports went to neighbouring countries such as Denmark and Norway. As paper capacity is often larger than conversion capacity in the integrated mills, a substantial share of the exports

is in the form of jumbo rolls for further conversion. These jumbo rolls are exported to subsidiary or independent plants in the UK and on the continent. The low sensitivity to business fluctuations is the result of operating at the end of the production chain close to the final consumer, and the non-bulk character of the converted products.

8.4.2 Integration Pattern

Tissue paper differs from other paper grades in the respect that technical integration is primarily between the paper and conversion stages. Swedish forest companies like MoDo and Lilla Edet early showed an interest in the markets on the Continent and UK. MoDo acquired 42.5 per cent of the shares in the Belgian company Mabelpap in 1964. The first tissue machine started up at Stembert in Belgium two years later. In 1970 Mabelpap was taken over completely by MoDo. Now Mabelpap is one of Europe's largest tissue plants with an annual capacity of 60,000 tonnes of tissue paper (see Table 8.1). MoDo also has a converting plant in Hawarden, UK. The British company was acquired in 1966 and the new plant was ready in 1968.

Table 8.1 Capacity of Tissue Plants Owned by Swedish Companies in EEC-Countries.

Company	Year of acquisition	Acquired plant	Capacity in 1980 (tonnes/year)
Mo och Domsjö AB (MoDo)	1964	Stembert (Belgium)	75,000 tissue (of which 40,000 is converted)
	1966	Hawarden (UK)	20,000 converted tissue
Lilla Edet AB (subsidiary to Ncb)	1963	Edet Denmark	6,000 converted tissue
	1964	Edet Netherlands	25,000 tissue (of which 15,000 is converted)
Mölnlycke AB (subsidiary to SCA)	n.a.	Friesland (Netherlands)	n.a.
	n.a.	Croisset (France)	n.a.

Source: Pulp and Paper International, October 1977, p. 64 and Annual Reports of MoDo, Ncb and SCA.

Lilla Edet have plants in the Netherlands and in Denmark. The subsidiary in Denmark was established as early as 1963. Among the plants in the two countries, tissue paper is produced only in the Netherlands. The plant in Denmark is a converting plant.

The third Swedish firm with foreign interests is Mölnlycke (SCA) which has plants producing tissue paper in the Netherlands and France. SCA also has interests in European tissue production through its minority interest in PWA.

All Swedish plants are partially or fully forward integrated with conversion. In general the paper production capacity is usually at least as large as the conversion capacity. There are no non-integrated conversion plants in Sweden. One reason for MoDo and Lilla Edet to have conversion plants in the UK and on the continent is to secure demand for the surplus paper capacity in the integrated mills.

8.4.3 Transactional Analysis <48>

By contrast with the other paper grades technical integration with conversion is a rule in Swedish tissue paper industry. Production is of a domestic local character and the demand for converted products stable. Most of the export is to neighbouring countries and/or in the form of jumbo rolls

The jumbo rolls consist of raw tissue paper that is to be converted. As paper capacity is larger than the technically integrated conversion capacity, Swedish export of raw tissue is required for full capacity utilization. Part of this export is captive in the form of internal supplies to integrated conversion plants in the EEC.

In principle it is only for the marginal quantities of captive raw tissue deliveries that an analysis of the type described in Section 3.4 is useful in an explanation of vertical integration in the Swedish tissue paper industry. Of overwhelming importance in a transactional analysis is, instead, small-numbers exchange due to technological interdependencies between paper and conversion.

Economies of technical integration. What are the cost advantages of technical integration of the paper and conversion stages and why is there no technical integration with pulp production?

There are in principle three reasons why technical integration is between paper and paper conversion and not between pulp and paper. Firstly, the transportation costs of tissue paper and converted tissue are high because of the bulkiness of the products. In the first half of 1983 the cost of transporting the base paper from Sweden to England was about 700 SEK per ton and the cost of transporting converted tissue the same distance about 1,200 SEK per tonne. This is to be compared to an approximate cost of about 300 SEK of transporting one tonne of pulp from Sweden to England. Converted tissue is thus almost twice as expensive to transport as raw tissue, which in turn is more than twice as expensive to transport as pulp.

Owing to these cost differences the paper and conversion stages tend to be located near the end-users. Selling tissue and converted tissue outside a radius of 400-500 kilometers from the mill is not profitable (see Figure 8.3). So if a Swedish forest company wants to assure the demand for pulp by forward integration it is cheaper to export pulp to a subsidiary foreign tissue mill than to export tissue paper. Furthermore, up to 1984 there were tariffs on exports to the EEC of paper but not of pulp.

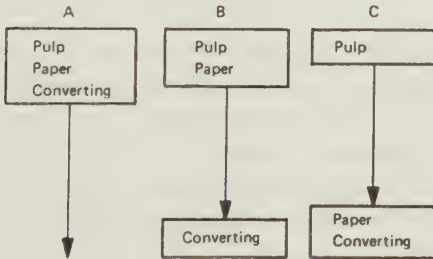
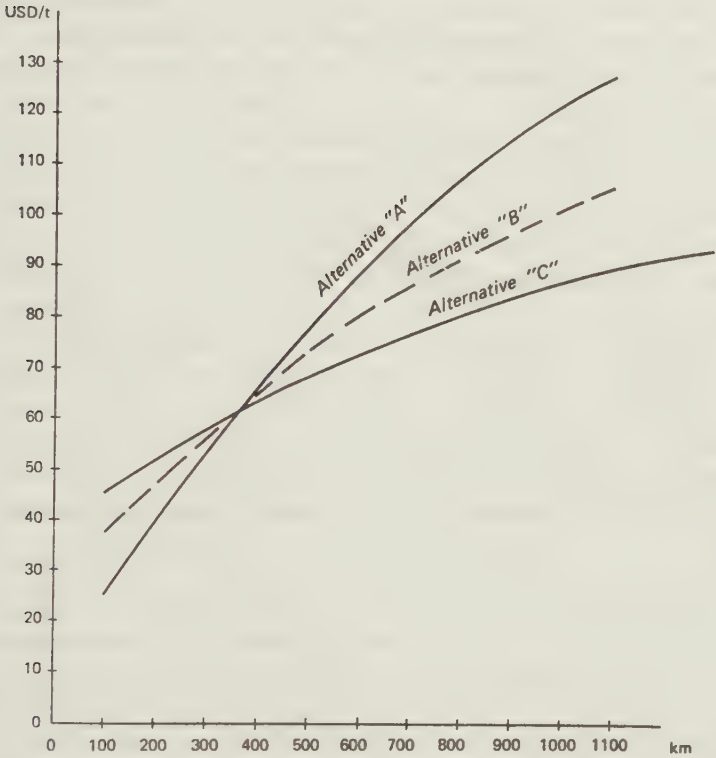
A second explanation for technical integration can be found in the high amount of waste in tissue production. The amount of paper waste in the conversion stage is 7-10 per cent of the base paper quantity depending on tissue product, which is much higher than for other paper grades. The waste is usually recycled into paper production in order to reduce fibre costs. The fibres are freed again by grinding and rewetting.

The most economical procedure is to feed the waste into the paper production of an integrated mill whereby transportation and storage costs can be saved. Sale of waste on the open market gives a revenue that is substantially lower than that obtained from the sale of pulp.

The lack of technical integration between the pulp and paper stages is also explained by the differing economies of scale of the two stages. While the efficient size of a chemical pulp plant is normally several hundred thousand tonnes per annum, a tissue paper machine is in general not larger than 40,000 tonnes/year. Furthermore, three or more different pulp grades are used in tissue paper production. With such a misfit between the pulp and paper stages, most of the cost advantages of technical integration will not be realized.

Choice of transactional arrangement. By building together the paper and conversion stages in one plant a bilateral trading relationship arises. A bargaining or quasi rent area is created that is at least as large as the cost advantage of technical integration (compare the discussions in Sections 3.3 and 6.5.4). Separate ownership of the two stages is likely to result in high transaction costs in the division of the quasi-rent. The harmonized profit incentives and better control capabilities of a vertically integrated firm can alleviate these transactional problems.

Figure 8.3 Marginal Costs of Three Integration Alternatives as Functions of Distance between Pulp Mill and Market Area.



Source: Ryti (1981a, Figure 12).

To sum up, unlike other paper grades tissue paper production is in general technically integrated with conversion but not with pulp production (cf. Table 4.1). Demand is stable and the market is local. Technical integration between the paper and conversion stages is motivated by the high costs of transporting raw tissue paper compared to pulp, and the cost advantages from recycling waste paper on the spot. Common ownership of the two stages is a way of avoiding transactional problems in the division of the quasi-rent accruing from the cost advantages of technical integration.

8.5 Summary and Concluding Remarks

For the three paper grades studied in this chapter there are three different patterns of organizing transactions in the production-distribution chains (cf. Tables 4.1 and 4.2). (1) Newsprint relies on transactions by market contracts, (2) fine paper has integrated into wholesaling but not with paper conversion and (3) tissue paper production is both financially and technically integrated with tissue conversion.

Newsprint is a standardized commodity. Swedish production is capital-intensive and export oriented. The profitability of the industry is thus sensitive to changes in operating rates and unit gross profits. Demand in contractual transactions has, however, proved relatively more stable than for most other export-oriented grades, whereby use of long-term contracts in small-numbers exchange is favoured.

Another factor contributing in making forward integration a less attractive strategy is that the demand for managerial competence required in newspaper publishing differs considerably from that required in newsprint production. There is also only a small share of the newsprint capacity that can be ensured by acquisition of a newspaper. Forward integration is therefore likely to give rise to much higher internal transaction costs.

Despite the fact that fine paper is a less standardized good than newsprint, fine paper demand is more unstable. During the last fifteen years there has been in Sweden a development towards larger paper machines, standardized products, export-orientation and more backward

integration. As a consequence demand has become more unstable and capital-intensity has increased. Forward integration into merchanting can thereby be regarded as a reflection of the greater importance of assured quasi-rents. Ownership of merchants is also an efficient way to speed up the process of standardization, create a brand name and take advantage of integrated information systems.

By contrast with other paper grades technical integration in tissue paper production is between the paper and conversion stages and not between paper and pulp production. Production is also more locally oriented and demand more stable than for most other paper grades. Common ownership of technically connected paper and paper conversion stages represents a way of avoiding transactional problems in the division of a quasi-rent.

Notes

1. See Papper och pappersmassa, 1976, p. 110.
2. See Svensk skogsindustri i omvandling, 1970, p. 237.
3. See Helmfrid (1954, pp. 343-345).
4. See PPI February 1974, pp. 41-44.
5. See Klint (1979, p. 68) and Nyström and Ahgren (1984, p. 2).
6. Interviews with Jan-Sture Enander (SCA) and Olof Lundqvist (Stora Kopparberg).
7. Cf. Nyström and Ahgren (1984, p. 34).
8. See Dagenais (1976, p. 446).
9. See Nyström and Ahgren (1984, p. 21) and Klint (1979, p. 29).
10. See Rydén (1976, p. 7).
11. See Brändström (1981, p. 12) and Nyström and Ahgren (1984, p. 10).
12. See Ds I 1979:5, pp. 399-400.
13. Cf. Klint (1979, p. 68).
14. See OECD, Pulp and Paper Industry 1981.
15. In PPI July 1981, p. 23, the difficulties of UK mills in competing with Scandinavian and Canadian mills are described.

16. See Wohlfahrt (1979).

17. For example, in 1980 the export of newsprint from Sweden and Norway to the UK was sold through a common sales office in London (see Svenska Dagbladet, July 3, 1980).

18. Interviews with Jan-Sture Enander (SCA) and Olof Lundqvist (Stora Kopparberg).

19. See Dagenais (1976, p. 445).

20. See Nyström and Ahgren (1984, pp. 46 and 49-50).

21. See Nyström and Ahgren (1984).

22. See Reader (1981, Ch 3).

23. See OECD 1982, p. 49.

24. Before the 1950s there were some smaller newsprint companies. The companies Wargön, Billingsfors-Långed and Tollare accounted for 7 per cent of production in 1950 (see Carling 1968 p 270). Among these Tollare, established in the 1920s, was the only mill outside the cartel Svenska Tidningspappersbrukens Förening (see Dahmén, 1950, p. 319).

25. See Reader (1981, p. 130).

26. Ibid., p. 120.

27. As for most other pulp and paper grades the Swedish companies have especially on the EEC market, mostly their own sales offices. But in terms of production in a succeeding stage or wholesaling there is no forward integration in newsprint.

28. See SPK 1979:6, p. 44 and Nyström and Ahgren (1984, p. 129). While the prices of grades such as bleached sulphate pulp and kraftliner sharply dropped during the recession in 1975-1976, it was still possible to increase the price of newsprint (see Klint 1979 pp 60, 62 and 64). At the same time the operating rates for newsprint did not decrease as much as for other paper grades (see table below).

Operating rates in Swedish paper industry, 1970-1980

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Newsprint	96	89	83	85	90	79	80	73	80	82	84
All grades	95	87	88	95	95	71	78	73	81	86	86
Newsprint variance: $s^2_{\bar{y}}$	6,23										
All grades variance: $s^2_{\bar{y}}$	8,49										

Source: SCPF statistics in Pulp and paper in Sweden, 1980, p. 4.

29. See Klint (1979, p. 64).

30. See Nyström and Ahgren (1984, p. 58).

31. Ibid., Ch. 4.

32. See Ryti (1980, p. 8, and 1981, p. 4).
33. See SPK 1980:7, p. 4.
34. See Paper, June 1981.
35. See Löf (1979).
36. See Ryti (1980, pp. 7-9) concerning these technological changes.
37. See SPK 1980:7, pp. 21-22.
38. The calculation is based on OECD statistics for the group "Other printing paper". This group includes in addition to woodfree paper magazine paper and other wood-containing paper (except newsprint).
39. Munkedal is the only unintegrated Swedish fine paper company. Among the other companies Wifstavarfs Bruks AB is supplied by pulp from the fifty per cent owner SCA's Östrand mill. Papyrus has 50 per cent of the shares in Norrsundet Bruks AB, which produces bleached sulphate pulp. In the mid 1960s there were at least five companies (Munkedal, Klippan, Papyrus, Silverdalen and Grycksbo) that were unintegrated or only partially integrated with chemical pulp production.
40. "In difficult periods . . . it is natural for companies to try to keep up their volumes. It is tempting to do so by competitive pricing, by sacrificing the price. But this will be only at the expense of one's competitors.
However, a company which tries to maintain or increase its volume by such measures can do so only for a limited amount of time before the competitors react with even lower prices. The result will inevitably be a general drop in the return on investment." (quotation from The challenge of the 80s - a marketing oriented industry in Paper June 1980 (Interview with Bernt Löf, managing director of MoDo Papper AB)).
41. See SPK Pressmeddelande, No. 53 1981, Södra Skogsägarna Annual Report 1981 and MoDo Annual Report 1981.
Note: In 1982 both MoDo and Södra Skogsägarna had ownership shares in Svenskt Papper AB (55 and 45 per cent respectively).
42. Interview with Jan-Sture Enander (SCA).
43. A parallel can be drawn here with the discussion in Williamson 1975 about the informational advantages of an inside position in an organization.
44. Interview with Olof Lundqvist (Stora Kopparberg).
45. See Pris och kartellfrågor, 1973, no. 7-8, p. 33.
46. See MoDo's Annual Report 1980, p. 21.
47. See MoDo's Annual Report 1979, p. 21 and figure at p. 21 in MoDo's Annual Report 1980.
48. This section is based on interviews with Birger Norberg (MoDo Konsumentprodukter).

9 SUMMARY AND CONCLUSIONS

The aim of this thesis is to explain the development of vertical integration in the Swedish pulp and paper industry by applying the theoretical framework of a transactional analysis.

The Swedish pulp and paper industry is characterized by price-searching (instead of price-taking) behaviour on nearby markets, export orientation, technical integration, high quasi-rents (due to capital-intensive production), largely standardized output and major cyclical variations in demand (which are especially pronounced for products with a raw material character). Theories that consider these aspects of the industry are relevant for this study.

The theoretical part of the study is presented in Chapters 2 and 3. In Chapter 2 the organization of transactions is studied. Vertical integration is characterized by (i) common ownership of physical assets and (ii) the use of an open-ended contract in the employment of labour in adjacent stages in the production chain. This implies that vertical integration makes it possible to replace the price mechanism by central administrative decisions, unlike other transactional arrangements such as short- and long-term contracts on product markets.

Two factors that make market transactions costly are (1) small-numbers exchange and (2) uncertainty of demand and supply conditions. Small-numbers exchange increases the costs of short-term contracts relative to other transaction modes, while the coexistence of uncertainty and small-numbers exchange also makes long-term contracts comparatively costly. Vertical integration offers the advantage of enhanced planning and control capabilities and harmonized profit incentives. These advantages tend, because of the rise in internal transaction costs, to disappear as the firm grows in size and increases its degree of vertical integration.

In Chapter 3 it is shown that different traditional theories of vertical integration can be regarded as special cases of the more general transactional approach underlying this thesis. Three theories with special relevance to the Swedish pulp and paper industry are given transactional interpretations: viz. bilateral monopoly, technological interdependency and sensitivity to variations in output demand and input supply.

This study demonstrates that in all these cases the transactional problems in contractual relations are caused by uncertainty in demand/supply and small-numbers exchange situations. Vertical integration (common ownership) is usually, under these conditions, a more efficient transactional mode. The larger the scope for bargaining due to small-numbers exchange and the greater the degree of uncertainty, the more likely is vertical integration to be the means chosen, *ceteris paribus*.

Bilateral monopoly is of especial interest in this study as it represents an extreme small-numbers exchange situation with only one seller and one buyer in the market. The bargaining area is then equal to the total quasi-rent of the two parties.

In the case of technological interdependency, the small-numbers exchange situation is due to investment in transaction-specific capital. After the investment has been made, there are within a price interval no other equally profitable business opportunities. This price interval therefore constitutes a bargaining area for the technically connected traders.

Sensitivity to demand and supply variations is a characteristic of capital-intensive firms. The higher the fixed costs the more sensitive firms' profits are to changes in operating rates and unit gross profits.

Primarily, due to low transportation costs the highest unit gross profits (unit quasi-rents) are obtained on nearby markets. With low price elasticities on nearby markets and large cyclical variations in demand, the seller benefits from an assured demand during recessions, while the buyer is most anxious for similar reasons to have an assured supply during booms.

Because of the low price elasticity on nearby markets, it is often preferred to compensate for losses of orders on these markets by increased sales/ purchases on more distant markets. The difference in gross profit between sale or purchase on a nearby and on a distant market can be interpreted as the part of the quasi-rent that can be appropriated in a small-numbers exchange situation on nearby markets. To prevent this part of the quasi-rent being wiped out by strategic and opportunistic behaviour, a common ownership solution can be preferred to a contractual relationship.

Chapter 4 describes how the theory developed in the theoretical sections is applied, with Tables 4.1 and 4.2 summarizing the empirical findings.

Chapter 5 studies the integration pattern between forestry and pulp production. The organization of Swedish wood transactions has to a large extent been influenced by successive legal limitations in the transferability of ownership rights to the forests.

When the Swedish forest industry started to grow rapidly during the last century, company purchases of private woodlots and 50 year cutting rights were allowed. Of these two arrangements, the companies showed a preference for the acquisition of cutting rights.

This relationship changed, when the maximum time period in cutting rights was reduced in 1889 to 20 years and in 1905 to 5 years. The effect was a rapid increase in backward integration through purchases of private woodland up to 1906, when a law against these acquisitions was passed. Since then, the possibility of forest companies to acquiring private woodland has been severely circumscribed in different Land Acquisition Acts.

By these legal restrictions, the existing vertical structure was made permanent. Next, a change in the horizontal structure towards increasing concentration and market power on both sides of the roundwood market started. The wood-purchasing industry was first to cartelize the market in the 1920s. As a countervailing power to these cartels, the private woodland owners began in the 1930s to organize themselves in forest owners' associations. Later, during the 2nd World

War, a system of annual price negotiations between wood-purchasing organizations and forest owners' associations developed. In other words, a situation of bilateral market power arose (i.e. a small-numbers exchange situation).

The high transportation costs relative to wood value are of especial importance in this situation. Earlier, woodland owners along a floatable river had a transportation advantage. The marginal cost of floating timber is very small compared to alternative transportation means such as, e.g., horse transport. There was therefore a scope for bargaining between the wood processing industry and the woodland owners along a river and the investments in floatways were of a transaction-specific nature. This explains the interest of the forest companies in ensuring supply from forests near a river, either through long-run cutting rights or backward integration.

Nowadays, floating of timber has been replaced by truck transport. Transportation costs are thereby more closely related to distance between a woodlot and a mill. The bargaining area between a mill and a nearby woodland owner is especially large during booms, when expensive imports are the alternative supply sources. As predicted by theory, individually negotiated cutting rights, of the stumpage sales type, are most common in transactions with nearby woodlots at the start of booms.

The organization of wood buyers and sellers in associations that act as representatives in annual price negotiations and intermediaries in the wood trade, has resulted in a situation of bilateral market power. There are both short- and long-run implications to consider. The capital invested in, e.g., a pulpmill is a sunk cost. In a short-run perspective, all gross profits could in principle be appropriated by a strong monopolistic seller.

In the long-run, however, no new investments will be made unless at least a normal return on the invested capital can be expected. Two ways to guarantee such a return in a small-numbers exchange situation, are to (a) conclude long-term contracts or (b) vertically integrate. The long-term contract alternative will be less attractive, the larger the scope is for ex post appropriation of quasi-rents through strategic or opportunistic behaviour. In Swedish wood transactions,

vertical integration is likely to be the most profitable alternative, since long-term cutting rights are illegal.

For the monopsonistic pulp and paper company small-numbers exchange situations are most likely to arise during booms. The low elasticity of domestic wood makes it more profitable to obtain marginal quantities through expensive imports than through non-discriminatory increases of the domestic price. For the individually negotiated stumpage sales a bargaining area emerges that is especially large in transactions with forest owners in the vicinity of a mill.

Due to the legal restrictions towards use of long-term cutting rights (maximum time period equal to 5 years) and backward integration, the forest companies are unable to respond to small-numbers exchange situations with the most efficient transactional arrangements. The boom in 1979-80 can serve here as an illustration of the advantages of integration. The least affected by domestic supply problems were companies with high self-sufficiency in wood.

As backward integration is prevented, integration during recent decades has been forwards by forest owners' associations. The investments in new pulp capacity in the south have primarily been made by forest owners' associations, not private companies, and the forest owners' associations in the north have integrated forwards by the acquisition of old pulp and paper mills. Because of the inability to exert direct central control of logging activities, the fairness principle that excludes the use of stumpage contracts, and the institutional difficulties in obtaining risk capital, this forward integration is claimed to represent a less inefficient response to small-numbers exchange situations than backward integration.

Chapter 6 examines the organization of pulp transactions. Small-numbers exchange is primarily caused by technological interdependencies between pulp and paper production. More than 50 per cent of Swedish pulp production is technically integrated with paper production.

The advantages of technical integration are especially large for paper grades that are (1) standardized, (2) produced from a few pulp grades, (3) show economies of scale, (4) have low transport costs and (5) for which strength and stiffness are important characteristics. Sackcraft, kraftliner, semi-chemical fluting and newsprint are examples of such paper grades. Lately, it has also become profitable to produce certain types of fine paper and folding boxboard in integrated mills.

By technical integration, savings from handling and thermal economies can be reaped. The division of the site-specific quasi-rent from these savings and possible technological dependencies is made difficult in a contractual relationship by disparate profit incentives. By common ownership of both the pulp and paper stages, transactional problems in the division of the quasi-rent can be avoided. In 1983 all technically integrated mills in Sweden had common ownership. An earlier example of separate ownership was not long-lived. To the 50 per cent technical integration can be added another 10 per cent of Swedish pulp production that is integrated only in a financial sense in terms of common ownership.

Most of the pulp production that is not technically integrated consists of bleached chemical pulp, which is the grade with the highest fixed costs in production. Other characteristics of bleached chemical pulp are (1) the export orientation, (2) relatively homogeneous products, (3) cyclical variations in demand, (4) the lower price elasticity on nearby markets where most of the production is sold and (5) the differences in unit gross profits between nearby and distant markets (which imply the existence of a site specific quasi-rent).

During recessions, the lower price elasticity and the higher unit gross profit make it beneficial to secure demand on nearby markets. One way to obtain stable relationships with customers on these nearby markets is by use of long-term contracts. In the pulp trade reservation contracts specifying quantities to be delivered during a time period of, usually, one year are used for this purpose.

Vertical integration is an alternative way to secure demand. In fact all the vertical integration has taken place on nearby markets. The advantages of vertical integration compared with a reservation contract are, *inter alia*, the superior planning and control capabilities of a common ownership arrangement. An integrated paper firm manager can, e.g., simply be ordered to use a certain amount of internally-supplied pulp.

Chapters 7 and 8 analyze the integration forward from the paper stage. Integration between paper and paper conversion, and paper and paper wholesaling, is studied for six groups of paper and board grades: liner and fluting, sackcraft, folding boxboard, newsprint and magazine paper, fine paper and tissue paper. By contrast with pulp and paper technological interdependencies between paper and paper conversion are rare. An exception is tissue paper.

For most paper grades vertical integration can be analyzed as a response to small-numbers exchange situations caused by sensitivity to demand variations. Contractual costs are dependent here on (1) size of fixed costs, (2) stability of demand, (3) price elasticity of demand on various markets and (4) differences in unit gross profits between nearby and distant markets. The influence of vertical integration on internal transaction costs could be added as another factor of importance in the analysis. The more the demand for managerial competence differs between the two stages, the more the internal transaction costs will rise in the case of vertical integration.

Forward integration of a non-technical nature with paper conversion is important for liner, fluting and sackcraft. Some of the major producers of fine paper with a high proportion of standardized products in the production scheme are instead integrated with wholesaling. Common to companies producing these grades are (a) high fixed costs due to complete integration with pulp, (b) unstable demand because of cyclical variations, (c) differences in unit gross profit (unit quasi-rent) between nearby and distant markets, and (d) lower price elasticity on nearby markets.

Paper grades with no forward integration are folding boxboard, newsprint and magazine paper, and more specialized fine paper products. Common to these grades are a relatively high stability of demand and a dissimilarity in character of the subsequent conversion stage. Inter-stage dissimilarities, in the form of, e.g., requirements for journalistic and printing know-how in the subsequent production stages, are likely to bring forth a considerable increase in internal transaction costs in the case of forward integration.

For many types of folding boxboard and fine paper the lack of forward integration can also be explained by a large-numbers exchange situation on nearby markets. The nearby trade in newsprint has much more of a small-numbers exchange character. The low degree of uncertainty, represented by a stable newsprint demand, contributes in making the long-term contract an efficient means of transaction.

Technological interdependencies are important for tissue paper. Savings in transportation and handling costs can be achieved by technical integration between raw tissue and tissue conversion. Swedish tissue mills are as a rule both technically and financially integrated with tissue conversion. By common ownership, problems in the division of the quasi-rent due to economies of technical integration are avoided.

As the minimum efficient scale in raw tissue production exceeds that of tissue conversion, there is some export of raw tissue. The demand for part of this export has been secured through the ownership of foreign conversion plants on nearby markets. In these cases sensitivity to demand variations on nearby markets explains forward integration.

To sum up, this thesis has demonstrated that a transactional approach is a fruitful way of analyzing vertical integration within the Swedish pulp and paper industry. A general framework based on this approach is developed, within which all existing theories of vertical integration are viewed as special cases. It has been shown that previous studies of the Swedish forest industry can be included in this general framework. It is our opinion that a transactional analysis of this kind is useful in empirical as well as theoretical studies of vertical integration.

APPENDIX A

Lists of Interviews and Mills Visited

Interviews:

Falck, Håkan	ASSI, koncernplanering
Hylander, Bengt	ASSI, ASSI Utveckling Massa och Papper
Wigardt, Mattias	ASSI, marknadschef kraftliner
Högberg, Torkel	Nymölla, VD
Rönno, Carl-Axel	Billerud, chef förpackningsdivisionen
Allgurén, Björn	Billerud, informationschef
Olsson, Olov	Fiskeby, chef marknadsutveckling
Wahlberg, Thomas	Fiskeby, chef teknik
Thulin, Ragnar	Iggesund, virkeschef
Larsson, Stig	Iggesund, överingenjör energi
Engström, Lars	Iggesund, överingenjör cellulosa
Sandberg, Ulf	Iggesund, överingenjör kartong
Strömberg, Jörgen	Iggesund, försäljningschef cellulosa och kartong
Nilsson, Evert	Ncb, direktör
Lundqvist, Olof	Stora, chef papper
Troedsson, Hans	Stora, bitr skogsdirektör
Karlsson, Nils	Stora, virkeschef
Eriksson, Börje	Papyrus, ekonomichef
Enander, Jan-Sture	SCA, VD i SCA Teknik AB
Berg, Benke	SCA, försäljningschef kraftliner
Löf, Bernt	MoDo, VD MoDo Papper AB
Nilsson, Torbjörn	MoDo, VVD MoDo Papper AB
Norberg, Birger	MoDo, teknikchef MoDo Konsumentprodukter AB
Hammarström, Claes	Södra Skogsägarna, försäljningschef cellulosa
Nordin, Bengt	Korsnäs-Marma, direktör
Wohlfahrt, Göran	SCPF, direktör handelspolitik, näringspolitik och energi
Sundberg, Carl Gustaf	SISU, direktör råvarufrågor
Lundström, Anders	Sågverkens Råvaruförening, direktör
Hiselius, Jan	Svenska Wellpappföreningen, direktör

Mills visited:

Skärblacka bruk, Skärblacka	(pulp, sackcraft, soft tissue and grease proof paper)
Dynäs fabriker, Väja	(sackcraft)
Husums fabriker, Husum	(bleached sulphate pulp and fine paper)
Lövholmens bruk, Piteå	(kraftliner)
Gruvön, Grums	(semi chemical fluting, sackcraft, sulphate pulp, kraftliner and folding boxboard)

APPENDIX B

Example of a Reservation Contract (Original Document).

LONG TERM CONTRACT

between

Sweden (the Seller) and

Italien (the Buyer).

The Seller agrees to sell and deliver to the Buyer the below specified annual quantities and quality of pulp.

The Buyer agrees to purchase and accept delivery of these quantities evenly spread over the year.

The agreed quality and quantity is:

<u>Pulp quality</u>	<u>Brand</u>	<u>Annual quantity</u>
Bleached softwood sulphate		6.000 + 1.000 MT in buyer's choice

The exact annual quantity should be specified by the buyer not later than August 31st during the preceding year.

The prices and sales conditions shall be negotiated quarterly and should be those generally prevailing for similar Scandinavian pulps at the time of negotiation.

This agreement enters into force on January 1st 1981 and can be terminated at any time by either party giving 24 month's notice in writing.

If during the term of the contract unforeseen structural changes occur to one or the other party, a possibility shall exist to negotiate a change of the contract, without regard to what is mentioned above as to time of notice of termination of this agreement

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